NEW ZEALAND JOURNAL OF

Agriculture

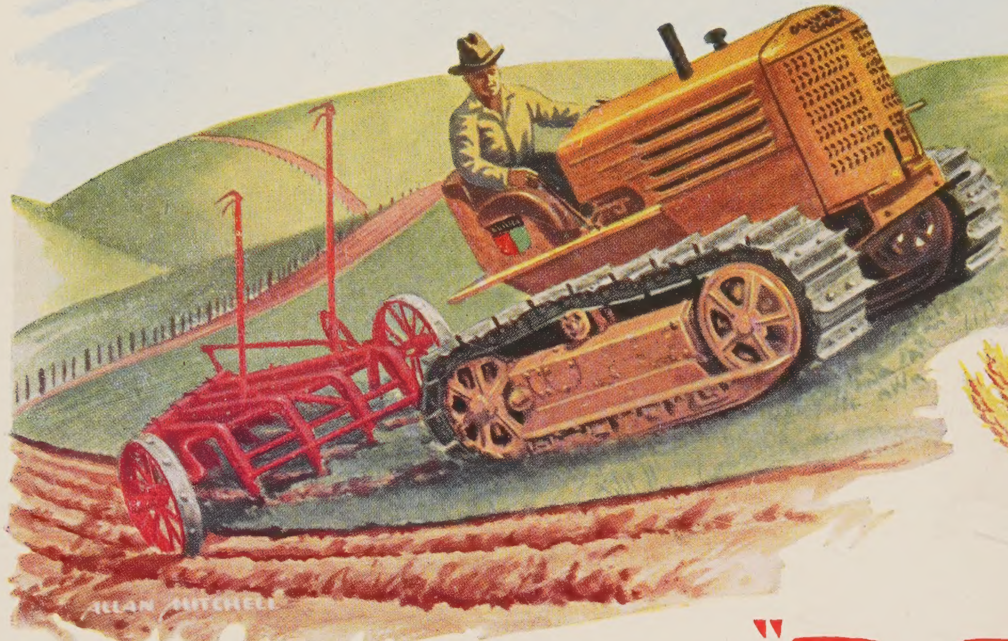
NOVEMBER · 1948

5—JAN. INSTITUTE

L. G. MITCHELL

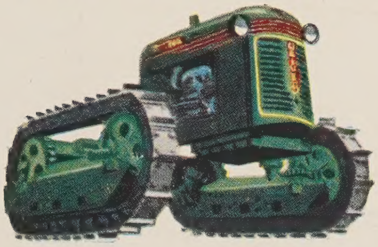
THE
OLIVER
CORPORATION

Announcement OLIVER "Cletrac" AGRICULTURAL CRAWLER TRACTORS



ONLY OLIVER "Cletrac" OFFERS *"Tru-Traction"*

POWER ON BOTH TRACKS AT ALL TIMES



Don't overlook OLIVER'S unique "HG" model. No other Crawler like it. 42" and 60" Track centres. Goes anywhere. 2/3 furrow capacity.

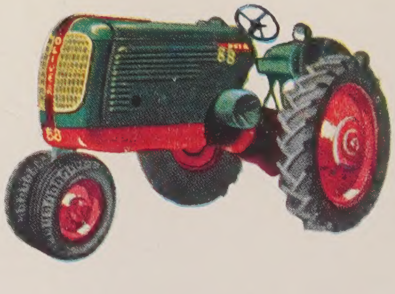
Following the merger of the Cletrac Tractor Company into the OLIVER Corporation, the range of Oliver Cletrac Agricultural Tractors from the popular "HG" model to the large Diesel Crawlers will be distributed throughout New Zealand by IVORY BROS. LTD.

These Tractors are still in very short supply; a large number of buyers are waiting deliveries, but it will more than pay you to wait and secure an OLIVER Cletrac.

SOLE N.Z. DISTRIBUTORS **OLIVER** WHEEL AND CRAWLER AGRICULTURAL TRACTORS:

IVORY BROS LTD.

BOX 1321 WELLINGTON



Volume 77
Number 5
November 15,
1948.
(Established 1910)

NEW ZEALAND JOURNAL OF Agriculture

Published by
Direction
of
Hon. E. L. Cullen,
Minister of Agriculture.

This month's cover

Though the draught horse has been largely superseded by machinery for cultivation and haulage work on many New Zealand farms, there seems little likelihood of the farm hack losing its value or its popularity for equestrian sport. Largely through the riding competitions held by agricultural and pastoral associations, which have engendered pride in performance in the show ring and a desire to improve hack breeding, the love of horses and enthusiasm for good horsemanship have remained a feature of country life. This month's cover has been painted by L. C. Mitchell from a photograph taken by National Publicity Studios on a Taranaki farm. The boxthorn hedge shown on either side of the gateway is the characteristic farm shelter grown throughout Taranaki.

•

New Zealand Department of Agriculture

HEAD OFFICE:
Dominion Farmers' Institute Building,
Featherston Street, Wellington.

DIRECTOR-GENERAL:
E. J. Fawcett

ASSISTANT DIRECTOR-GENERAL:
R. B. Tennent

DIVISIONAL DIRECTORS:

Animal Research .. .. J. F. Filmer
Dairy .. .. H. A. Foy
Extension .. .. P. W. Smallfield
Horticulture .. .. .. W. K. Dallas
Livestock .. .. .. W. C. Barry

Editor: R. E. Owen

TABLE OF CONTENTS

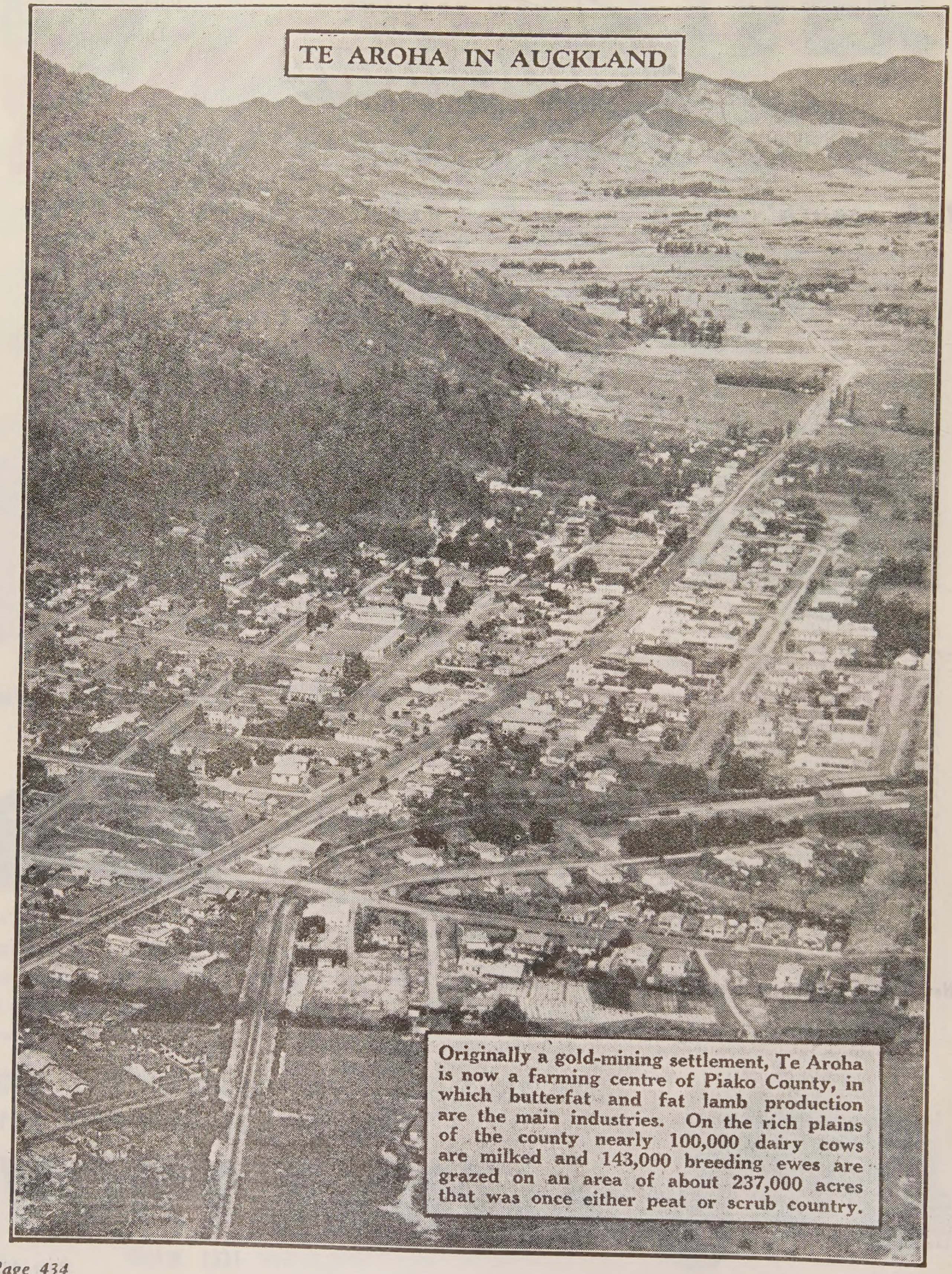
Extension of Government Herd-recording Services		435
Allocation of Dollar Funds for Farm Tractors		436
Chemical Methods of Weed Control	P. B. Lynch	437
Tomato Culture in Troughs Under Glass	J. D. Galletly	445
Dairy Produce Graded for Export		447
Seed Production in New Zealand: Perennial Ryegrass	E. G. Smith	449
The Home Garden	A. G. Kennelly	457
Meteorological Records for October		462
Foot-rot in Sheep can be Eradicated	J. F. Filmer	465
Rack for Feeding Hay to Sheep	R. Inch	468
Radio Broadcasts		468, 480
Mechanical Aids to Silage Making	C. J. Crosbie	469
Sub-irrigation of Glasshouse Tomatoes	F. L. Bailey	475
Advantages Gained from Binning Wool	J. G. Ball	477
Growing Culinary Mustard in Canterbury	I. J. Purdon	479
Internal Parasites which Infest Poultry	A. C. Howse	481
Control of Diseases and Pests by Spraying in Commercial Orchards	A. H. Eddie	483
Elimination of Border Rows in Cereal Trial Plots	K. Cottier	486
Care of Livestock During December		488
Trees and Hedges for the Approach to the Farm	M. Sutherland	489
Topping of Pastures: Silage Making		496
History of Young Farmers' Clubs Movement in New Zealand		497
Chemical Disinfection of Glasshouse Soil for Tomato Crops	S. O. Gillard	501
Control of Blackberry and Gorse with Hormone Sprays	J. F. Brown	503
Trees can Reduce Work of Maintaining Open Drains	G. L. Banfield	504
The Value of Litter Recording		505
Show Dates		508
Effect of Roof Colour on Hive Temperatures	D. S. Robinson	509
Mould for Making Concrete Pipes	A. J. Kerse	510
Career Opportunities in the Department of Agriculture		511
Britain's Economic Position Still Critical		513
Grading Points for Export Butter and Cheese		518
Tall Fescue Grass is Poison for Cattle	I. J. Cunningham	519
Christmas Island Phosphate		520
The Flower Garden	J. P. Hudson	521
A New Shirt from the Pattern of an Old One	Eva Topping	527
Mental Nursing Offers Opportunities for True Service		530
Saving Labour in the Home	Edith G. McNab	531
The Importance of Good Design	Norma K. Metson	535
Christmas Gifts from the Kitchen	Eva Topping	537
Skin Caps for Preserving Fruit	Evelyn E. Moore	541
Pressing Woollen Garments	Edith G. McNab	543
Methods of Cleaning Silverware	Eirene Unwin	544

SUBSCRIPTION RATES

The "Journal" is issued monthly. The subscription within New Zealand is 2s. 6d. a year; the overseas subscription is 5s. The "Journal" may be ordered from any bookseller or newsagent, or direct from any office of the Department of Agriculture. Individual copies are available at 3d. a copy, post free.

REGISTERED AT THE G.P.O., WELLINGTON, AS A MAGAZINE.

TE AROHA IN AUCKLAND



Originally a gold-mining settlement, Te Aroha is now a farming centre of Piako County, in which butterfat and fat lamb production are the main industries. On the rich plains of the county nearly 100,000 dairy cows are milked and 143,000 breeding ewes are grazed on an area of about 237,000 acres that was once either peat or scrub country.

[V. C. Browne photo.

Extension of Government Herd-recording Services

THE two systems of Government herd recording administered by the Dairy Division of my Department continue to receive increased support from breeders of pedigree dairy cattle. At present more than 600 breeders have cows on test, and it is expected that when the season reaches its peak there will be some 1500 registered purebred cows on Certificate-of-Record Test and more than 10,000 on Government Official Herd Test. Those are considerable increases over the numbers on test under these systems during the season immediately preceding the war. The need for C.O.R. and O.H.T., as well as their popularity, is amply demonstrated. In fact, the remarkable increase in entries has brought my Department some embarrassment because of the great difficulty, caused by war influences, of finding sufficient field staff and providing the transport necessary to cope with the monthly testing visits to farms, and of maintaining sufficient clerical staff to handle the large mass of essential statistical work in the head office of the Dairy Division.

However, the position in the field is gradually easing, and recently-introduced changes are expected to improve the clerical service and also enable the Dairy Division to introduce additional services planned and approved some 3 to 4 years ago. In future, routine monthly returns of yield in the majority of cases will be calculated by the testing officers and checked in district offices or, in some cases, in the Dairy Division in Wellington, thereby eliminating much of the delay which has been unavoidable under the staffing conditions of recent years. This easing of the pressure on clerical staff will permit the early introduction of a lifetime merit service for pedigree cows along lines already approved by breeders' associations. Recommendations for a sire survey service are also being prepared and will be discussed with the associations at an early date.

From April 1, 1949, the Department expects to be able to bring in the rule requiring that an owner who wishes to make entries place on either C.O.R. or O.H.T. every sound pedigree cow in his herd. That means that the testing of selected entries will no longer be permitted. This requirement, also approved by breeders' associations some time ago, is in keeping with modern thought and should contribute much toward more reliable and complete data behind pedigree sires and families.

The costs of Government herd recording have increased considerably in recent years, though fees have not been altered since the introduction of Government Official Herd Testing in 1927. The present fees are £8 8s. for the first C.O.R. cow for each breeder each year and £3 3s. for each additional entry, and 5s. per cow for O.H.T. After a careful survey of costs, I have decided that from April 1, 1949, the initial fee for each breeder each year will be £10 10s. and the O.H.T. fee 10s. per cow, subsequent C.O.R. entries each year to be charged for at £3 3s. as at present. The new fees are considered to be more in keeping with those of the herd-improvement associations, which have found it necessary to increase their fees at least twice in recent years. The value of C.O.R. and O.H.T. to breeders of pedigree dairy cattle is such that I am sure they will consider the new scale of charges not unreasonable. Even these fees will not meet the full cost of the work.

I would take this opportunity of expressing thanks to the dairy cattle breeders' associations for their co-operation with the Dairy Division of my Department in the operation of the testing work, and to testing breeders for their patience with a curtailed service during the long period of extreme staffing difficulties.

The three developments planned a considerable time ago and now to be brought into effect—lifetime merit, sire survey, and the "all-cow" rule—will mark a desirable advance in the service given to breeders of pedigree dairy cattle through the two Government herd-recording systems. They will also provide a closer link with the Dairy Board's herd-improvement plan and work for the general good of the movement. It is particularly pleasing to me to know that in these affairs there is close co-ordination between the Dairy Division and the Dairy Board, which is consulted on all questions of general application to herd improvement as distinct from those of particular application to the C.O.R. and O.H.T. systems. The Director of the Dairy Division is the representative of my Department on the Herd Recording Council, and the Supervisor of Government Herd Recording is a member of the technical advisory committee of the Dairy Board. Thus an excellent liaison ensures that both organisations work to mutual advantage and that there is no overlapping.

Herd recording and its concomitant services are becoming increasingly important, and only by the continuous testing of a far larger number of pedigree cows can we hope to gather sufficient data to enable an accurate assessment of the value for breeding of the Dominion's purebred sires. Such data have always been important, but the extension of the practice of artificial insemination has made it more essential than ever that sires be proven beyond all reasonable doubt before being used for that purpose.

The Certificate-of-Record Test and the Government Official Herd Test were designed to enable breeders of pedigree dairy cattle to obtain authentic records at reasonable cost. I feel sure they will continue to support these systems as enthusiastically as in the past.

EDWARD CULLEN, Minister of Agriculture.

Allocation of Dollar Funds for Farm Tractors

THE Government's acceptance of recommendations for the allocation of $5½ million for the importation of farm tractors, spare parts, and implements from North America during the 1949 licensing period was announced recently by the chairman of the Aid for Britain National Council, Mr. F. P. Walsh.

THE National Council had asked the Government some time ago to consider bequests made to the council by Federated Farmers of New Zealand for the release of a considerable sum of dollars for the purchase of tractors and other farm machinery to enable farmers to obtain the maximum increase in the production of food for Britain, said Mr. Walsh.

In view of agreements made with the Government of the United Kingdom, the New Zealand Government had been anxious to ensure that before heavy calls were made on the Commonwealth dollar pool the availability of suitable British tractors was fully investigated.

The Government, fully aware of the necessity of obtaining the greatest possible food production at present, had immediately set up a special committee (on which the Aid for Britain National Council had been represented by its chairman) to investigate the extent to which suitable tractors and farm implements were available from Britain and the degree to which it would be necessary to call on dollar funds to supplement supplies from British sources.

Federated Farmers had made a survey of the needs of each of their members and the relation of these needs to increased production and as a result they had asked the committee to recommend the provision of just over $6 million for imports of tractors and implements from dollar sources in the next licensing period. Discussions with British importers and representative practical farmers had followed, with the result that detailed specifications by Federated Farmers had been amended, in minor respects, with their agreement, and provision had been made for additional spare parts. With the full concurrence of Federated Farmers and after an exhaustive survey and inquiry the committee had made detailed and specific recommendations to the Minister of Finance, the Rt. Hon. W. Nash, which he had accepted in full on behalf of the Government.

In the next licensing period, therefore, dollars would be made available for the importation of specific types of tractors as follows:—

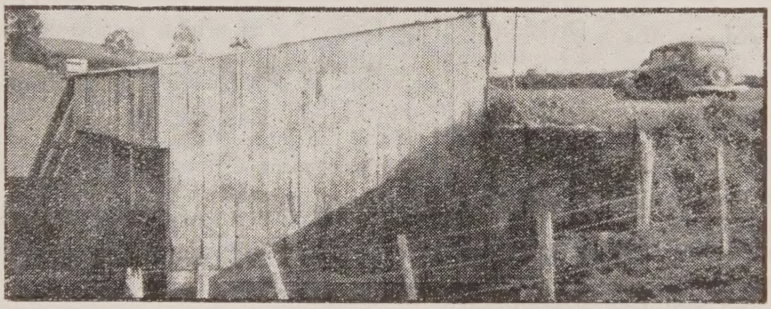
	Number	Cost $
1-furrow wheel ..	751	699,565
3-4-furrow wheel ..	500	835,570
4-5-furrow wheel ..	160	302,908
2-furrow crawler ..	55	78,660
3-furrow crawler ..	189	585,572
4-furrow crawler ..	149	644,620
	1,804	3,146,895

To this figure for tractors had been added $781,700 for spare parts and $1,302,293 for implements and spares, and $267,680 had been set aside as a reserve or buffer pool for allocation if availability of particular types varied during the year. In all, therefore, $5,498,568 had been allocated to procure for farmers essential machines not available from sterling sources, but urgently needed to help them produce the maximum of food. In addition, of course, to this large allocation for purchases from dollar sources, licences would be issued to cover the purchase of about 5500 British tractors and spares, estimated to cost £2½ million.

"World food supplies are far from sufficient to maintain the present population and it is therefore our prime duty to see that this country produces every pound of food of which it is capable," said Mr. Walsh. "To help to this end the Aid for Britain National Council has continually pressed to have tractors and machinery made available to farmers so that science can be allied with labour in increasing food production. Farm labour has in recent years been in shorter and shorter supply and the trend has had to be from the team of horses, wasteful in terms of labour employed and feed consumed, to the more efficient and cheaper machine. It was with these factors in mind and at the direct instigation of the national council that an extra $1 million was made available to buy tractors last year from America to boost production of cereals, and the willing co-operation of farmers and their workers seems to have assured a considerable increase in cereal acreage already this year.

"I feel certain that farmers will be pleased to know that the Government, realising the absolute essentiality of machinery in today's great struggle to save life by providing the maximum of food, has met their wishes so fully. The responsibility is now the farmers', and if last year's results are any indication, I know New Zealand farmers will not fail the world's hungry millions. Though almost all New Zealand's food produce goes to Britain, it swells the world's pool and ensures that hungry and starving people in many lands have a better chance of survival."

Hillside Barn for Lucerne Hay



WHEN several cuts of lucerne are obtained each year, the problem arises of how best to store the material until its use in winter. The first cut often must be made into silage because of the difficulty of drying it at that period of the year, and the following cuts are usually made into hay. If a large stack is started with the first hay crop and the following cuts are built on top of it, difficulty is often experienced in keeping the butt dry while waiting for the next cut. If several smaller stacks are made, usually in the lucerne field, a considerable area of the crop is killed out. These difficulties have been overcome by Mr. A. J. Coubrough, of Tirau, South Auckland, who has built a hillside hay barn and silo combined which allows easy handling of the crop. However, this type of construction is possible only where the lucerne paddock is undulating.

When the lucerne is cut from the paddock in which the car is standing in the illustration, it is either built into the silo in the near end of the shed or, for hay, forked through openings in the side facing the car. When required the material is taken from the low side of the shed, obviating most lifting. With this shed 5 acres of lucerne hay can be stored safely by 3 men in 2 hours.

—*G. A. BLAKE, Instructor in Agriculture,*
Department of Agriculture, Matamata.

CHEMICAL METHODS OF WEED CONTROL

Recommendations of New Zealand Research Workers

WHEN some 2 years ago it was realised that developments in the control of weeds by chemicals were proceeding at a rate that demanded that a great deal of critical attention should be given to the subject, the Field Crop Committee, which is the body co-ordinating research work into field crops other than wheat in New Zealand, set up a Sub-committee for Chemical Weed Control to give the problem the detailed study it demanded. The following compilation by P. B. Lynch, Field Crop Experimentalist, Department of Agriculture, Welington, of reports from members of the sub-committee is a timely and authoritative statement on the behaviour both of weeds and some economic crop plants toward chemical weedkillers.

Spraying hard fern in Taranaki hill country, using a knapsack sprayer. An arsenical weedkiller is being applied, as hard fern is resistant to hormone-type weedkillers.

ORGANISATIONS represented on the Weeds Committee, as the sub-committee is commonly called, are the Agronomy and Botany Divisions and the Plant Chemistry Laboratory of the Department of Scientific and Industrial Research, Canterbury and Massey Agricultural Colleges, and the Extension Division (including the Soil Fertility Research Station) of the Department of Agriculture, so that practically all research workers in chemical methods of weed control are represented.

RECOMMENDATIONS OF THE COMMITTEE

Recommendations of the committee are as follows:—

Description of Materials

The chemical weedkillers described in this report may be listed as follows:—

A. Hormone Weedkillers (more correctly, Growth Regulator Compounds)

Hormone weedkillers have been described previously by the following in "The New Zealand Journal of Agriculture":—R. K. Ward (July, 1946, issue), J. P. Hudson (August and September, 1946, issues), and P. B. Lynch (August, 1947, issue). A wide range of materials, which are of two main types, is covered by this description.

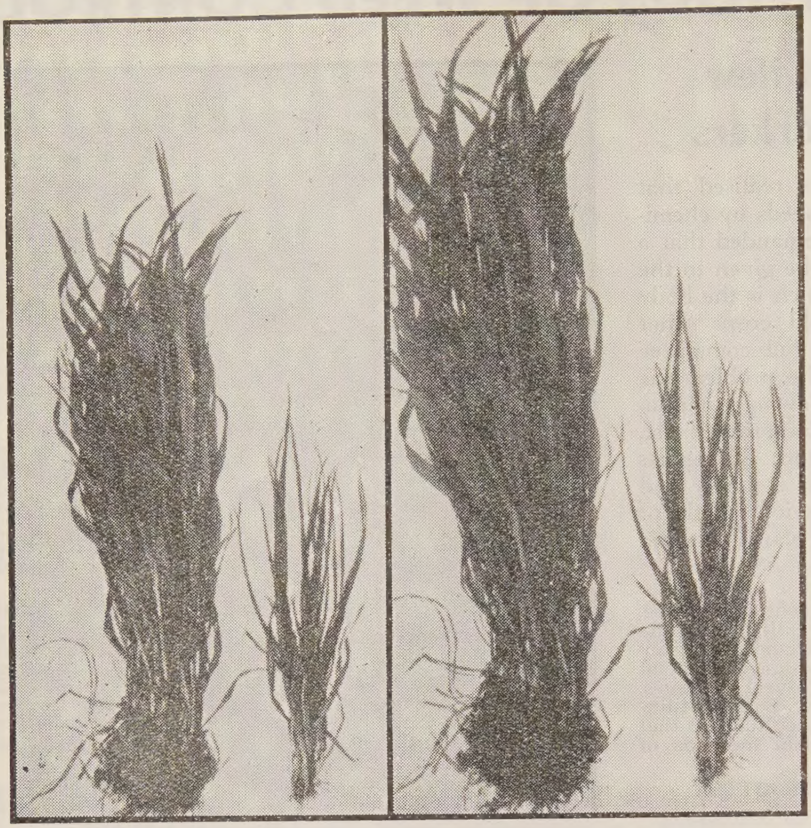
Plantain (ribgrass) and capeweed in pasture showing typical distortion after spraying with a hormone weedkiller.

(i) **2, 4D acid** (2, 4 dichlorophenoxyacetic acid) base, represented by the following compounds:—
  - (a) **Esters:** Most esters are not soluble in water, but are soluble in oil. Consequently many commercial preparations are solutions of esters in oil. Examples are "Weedone," "Thompson's Weedicide," and "Stantox Ester P44."
  - (b) **Amine salts:** These (and the sodium salts) are mostly water-soluble. Commercial preparations of amine salts of 2, 4D are "Weedar," "Dee Cee Pee," "2, 4 Dow Weedkiller 40," "Thompson's Weedicide Liquid Concentrate."
  - (c) **Sodium Salts:** Examples are "Chloroxone," "Stantox Powder 70," "2, 4 Dow Weedkiller," "Thompson's Weedicide Powder 100."

(ii) **M.C.P. acid or "Methoxone"** (2 methyl, 4 chlorophenoxyacetic acid) base, represented commercially by "Agroxone."

When rates per acre of the hormone weedkillers are referred to in this report they will be given in **pounds of acid (2, 4D or M.C.P.) equivalent.** As many products are sold in solutions of approximately 10 per cent. strength, these rates will be equivalent to gallons per acre of such materials. However, it is anticipated that in future many weedkillers will be available in more concentrated forms than 10 per cent. solutions and it is therefore essential that users adjust the gallons per acre to be applied of these concentrated weedkillers on the basis of their acid equivalent content. The dilution of the materials appears to be of secondary importance provided that run-off losses are not excessive. With new low-volume spraying some products may be applied neat as purchased or in dilutions such as 1:2 or 1:4, but spray equipment delivering 100 gallons per

CHEMICAL METHODS OF WEED CONTROL



These samples, taken from an official experiment, show on the left in each half of the illustration plants of Hunters wheat from plots treated with a water-based hormone spray, and on the right plants from plots treated with an oil-based hormone spray.

acre would require dilutions of 2:100 (for a 2lb. per acre acid equivalent application of a 10 per cent. solution) or 1:100 for a 1lb. per acre treatment.

The advantages of hormone weedkillers may be summarised in that they are non-poisonous to animals, non-corrosive, relatively easy and pleasant to use, and are effective against many weeds which are resistant to other types of weedkillers and do relatively little damage to pastures or cereal crops.

B. D.N.O.C. Compounds (dinitro-ortho-cresol base)

D.N.O.C. compounds were formerly used as dyestuffs and insecticides and were developed as plant poisons in France in 1933. The commercial form in which these are distributed in New Zealand is the sodium salt "Sinox;" other commercial D.N.O.C. products are known as "Denoc," "Dinoc," and "Extar-Sandoz."

The D.N.O.C. compounds are true plant poisons in that they destroy plant tissue with which they come in contact. This is true of the majority of weedkillers, with the notable exception of hormone weedkillers, which act as growth regulator compounds. Plants may be stimulated by these hormone-type compounds to excessive growth, and they use their stored food materials at such a rate that they literally starve themselves to death.

D.N.O.C. weedkillers have certain advantages in comparison with some other forms of weedkillers in that they are relatively non-poisonous and are quickly decomposed in the soil, so that there is no lasting toxic effect. On the other hand they are vivid dyes (yellow or orange), dissolve rather slowly, and are absorbed rather slowly by the plant, so that rain falling shortly after spraying may wash the material off before it has time to take effect. They are contact poisons and are not transported through the plant. Perhaps the most serious disadvantage is the extent to which the effect of these compounds varies with weather conditions. The higher the temperature the greater is the effect; also the higher the relative humidity (within the crop) the greater is the effect. The addition of sulphate of ammonia increases the toxicity and the rate of absorption of the sodium salt "Sinox" into the plant. An application of 20lb. (that is, 2 gallons of the commercial paste) per acre of "Sinox" is equivalent to one of 10lb. (1 gallon) of "Sinox" plus 1lb. sulphate of ammonia per acre. This is a more or less standard application, the concentration of the spray being of little importance within the range of high-volume applications. Due to the nature of the material it is doubtful whether it could be successfully used through the fine nozzles required by low-volume spraying.

The D.N.O.C. group can be regarded as supplementary to the hormone weedkillers, as they are of particular value when used to control weeds in crops which are severely damaged by the hormone weedkillers. The best examples of these crops are onions, leeks, and peas. Both materials may be used with care in linseed and linen flax. Some weeds, particularly some annual weeds, are controlled rather better by D.N.O.C. materials than they are by the hormone-type weedkillers. As a general rule, however, the hormone weedkillers are to be preferred to the D.N.O.C. compounds, as they have considerably greater killing power against a wider range of plants.

C. Sodium Chlorate

Sodium chlorate weedkiller, or the form known as "Atlacide", in which calcium chloride is added to sodium chlorate to reduce fire and explosion risks, has been used for many years in New Zealand, particularly against ragwort and blackberry. It is still considered a very useful material if care is taken in handling it. Clothing and sacks impregnated with sodium chlorate are liable to ignite spontaneously on drying. It is a non-selective weedkiller and will damage pasture grasses, clovers, and desirable crop plants.

D. Power Kerosene

Power kerosene kills a wide range of weeds and has particular application for weed control in carrot crops when these are sprayed in the one or two fern leaf stage. Applications at a later stage than this are liable to cause tainting. Carrots have proved resistant to most power kerosene sprays, but power kerosene is variable in composition and some lines will kill carrots. It is therefore advisable to try it on a small scale first. The use of mixtures of hormone weedkillers with power kerosene shows promise against resistant woody plants such as gorse, broom, and blackberry.

No attempt can be made in an article of this nature to deal with the multitude of other chemicals used as weedkillers, some of which are salt, borax, arsenical preparations, thiocyanates, carbon bisulphide, chloropicrin, copper sulphate, sulphuric acid, crude oil, and iron sulphate. The main emphasis of the work in recent years has been on the hormone-type weedkillers and most of the references will be to these materials.

ANNUAL CROPS

1. Effect of Hormone Weedkillers on Crops

Wheat, oats, barley, and ryecorn: Hormone weedkillers in water solution may be used to control susceptible weeds in these cereal crops at quantities up to 2lb. per acre acid equivalent.

Materials in oil solution, such as "Weedone," should not be used on arable crops generally, including cereals, as the risk of damage to the crop is too great. Water solutions such as "Agroxone" and "Weedar" sprays should be used.

Californian thistle at Darfield, Canterbury, being sprayed with a home-made machine. Weeds at this stage of growth should react satisfactorily to treatment.

Treatment should be undertaken when the crop is 6 to 8in. high or after the 6-leaf stage and before shooting commences.

Linseed and linen flax: Hormone weedkillers in water solution may be used on linseed and linen flax in quantities up to 1lb. per acre acid equivalent. **Oil-based materials must not be used.** With the above limitations it appears that crops grown for seed purposes may be safely treated. No definite information is available as yet on the effect of these materials on the yield of fibre of linen flax. Their use on linen flax should be restricted to crops badly infested with weeds and likely to be seriously reduced in value in consequence. Linen flax may be safely treated when 4 to 6in. high; the plants may droop temporarily, but recover within a few days.

Tomatoes, rape, chou moellier, turnips, swedes, cabbage, cauliflowers, and all brassica crops should under no circumstances be sprayed with hormone weedkillers. Even spray drift from neighbouring areas is harmful to such crops.

Peas, lupins, lucerne, carrots, leeks, beetroot, onions, pumpkins, parsnips, beans, sugar beet, and mangolds, although rather less susceptible than brassicas, are liable to severe damage and **should not be sprayed with hormone-type weedkillers.**

Potatoes and maize are relatively resistant to hormone weedkillers, but little work has heen done in New Zealand on these crops. Quantities up to 1lb. per acre acid equivalent of water solutions of hormone weedkillers may be used, but **large-scale applications are not advised** until more research is conducted.

Asparagus appears relatively resistant to hormone weedkillers when **in the fern stage,** and sprays of water solutions up to 1lb. per acre acid equivalent may be used **at this stage only.**

2. Effect of D.N.O.C. Weedkillers on Crops

(A "moderate" application is 20lb. "Sinox" per acre or 10lb. "Sinox" plus 1lb. sulphate of ammonia per acre.)

Wheat, oats, barley, and ryecorn are resistant to moderate applications of D.N.O.C. weedkillers and may safely be sprayed.

Linseed and linen flax are susceptible when young and **must not be sprayed until 4in. high;** after this they are highly resistant to moderate applications of D.N.O.C. sprays.

Rape, chou moellier, and all brassica crops are susceptible and must not be sprayed with D.N.O.C. materials.

Onions, leeks, and peas are susceptible as very young plants until the 3-leaf stage, but may be safely sprayed at a later stage. The D.N.O.C. compounds are consequently useful materials for these crops which cannot be sprayed with hormone-type weedkillers.

Lupins, lucerne (when young), carrots, parsnips, beans, sugar beet, mangolds, and potatoes are liable to severe damage and should not be sprayed with D.N.O.C. materials.

D.N.O.C. sprays are much more effective on weeds in the seedling stage, but also are **liable to damage crop plants if these are sprayed before becoming well established.**

3. Effect of Sodium Chlorate on Crops

Sodium chlorate is relatively non-selective and **cannot be used to control weeds in growing crops,** as severe damage is likely to result from such treatment.

4. Effect of Power Kerosene on Crops

The only crops that may be successfully sprayed with power kerosene are **carrots and parsnips;** all other crops will be severely damaged or killed.

PASTURE PLANTS

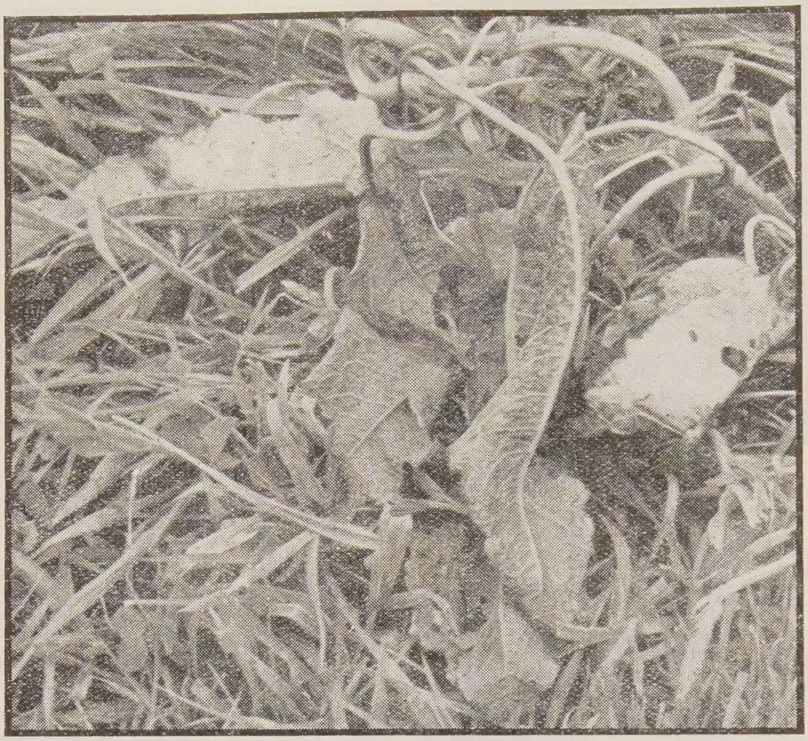
Hormone Weedkillers

Grasses past the seedling stage are generally very resistant to hormone weedkillers in moderate applications (up to 2lb. per acre acid equivalent), but damage occasionally results, particularly from the oil-based sprays. Browntop and cocksfoot have definitely been affected temporarily, although permanent injury is very rare. Hormone weedkillers should be used on pastures or lawns only in conjunction with measures such as reseeding and topdressing to close up the sward when the weeds are killed.

Seedling grasses are susceptible and should not be treated until at least 6 weeks old. The elimination of susceptible weeds in pastures for seed production with hormone sprays is probably feasible, but little research has been conducted on this method to date. Hormone weedkillers can be

Weeds can be controlled just as effectively by cultivation as by chemicals. In this paddock on the farm of the Roseworthy Agricultural College, South Australia, there is a marked contrast in weed content (oxalis) between the headlands and the centre of the paddock. Drilling was stopped by rain and the centre of the field received an extra cultivation before being sown, and this effectively controlled weed growth.

CHEMICAL METHODS OF WEED CONTROL



The effect of hormone weedkiller on a mature dock plant. This spectacular distortion and probable subsequent kill are more likely to result from the spraying of mature docks than from the treatment of immature plants in a sward, which have a much smaller leaf area to absorb the spray.

confidently recommended for the control of many lawn weeds without permanent damage to lawn grasses.

Clovers, on the other hand, are liable to damage from moderate applications of hormone weedkillers. The perennial clovers such as white clover will usually recover satisfactorily after a few weeks, but annual clovers such as suckling clover may be killed. **The possible effect of the hormone weedkillers on clovers makes it necessary to use these materials with caution, particularly on swards naturally weak in clovers.** Heavy applications, say more than 2lb. per acre acid equivalent, should be avoided. The oil-based compounds are generally more severe in their effect on pasture plants. However, as they are frequently more effective per unit of active material than water-based sprays, they may be used in smaller quantities per acre to give satisfactory weed control without severe damage to valuable pasture plants.

Dust preparations of hormone weedkillers may be used satisfactorily against pasture and lawn weeds where the weeds treated will hold appreciable quantities of the powder. However, dusts are considerably less efficient against weeds in crops, which are difficult to cover satisfactorily, and against more upright weeds on which it is difficult to ensure the retaining of sufficient dust on the treated plant. Hormone weedkillers applied as sprays are generally more efficient per unit of active material than when they are applied as dusts. Uniform distribution is generally easier to obtain with sprays than with dusts.

D.N.O.C. Compounds

Because the majority of weeds of permanent pasture are perennial weeds against which D.N.O.C. materials are relatively ineffective, the use of D.N.O.C. compounds as sprays for pasture weeds is not recommended. They cannot kill perennial weeds because they cannot penetrate the roots from which fresh shoots arise. Seedlings and shoots may be killed, but underground parts of established plants are not affected. Pasture grasses and established clovers are resistant to moderate applications of D.N.O.C. compounds.

Sodium Chlorate

As moderate to heavy applications of sodium chlorate will kill many pasture grasses and clovers, the broadcast application of this substance on pastures cannot be advocated. "Spot" treatment of isolated weeds, such as ragwort, however, gives satisfactory control without general pasture damage.

Kerosene

Kerosene will kill most grasses and clovers and cannot be used to control pasture weeds without damage to desired pasture species.

WEEDS

Hormone Weedkillers

The following lists give present knowledge of the action of hormone-type weedkillers on a number of common weeds of pastures, crops, and waste-land. The lists are incomplete and the information only tentative and open to correction in the light of further research. They should, however, provide a guide to intending users of these forms of weedkillers.

The following are the approximate rates of material designated as heavy, moderate, and light:—

Type of Application	Pounds per acre 2, 4D or M.C.P. Acid Equivalent (as sprays)
Heavy	More than 2lb. (say up to 4lb.)
Moderate	1 to 2lb.
Light	½ to 1lb.

The weeds have been classified into classes, based on the following reactions to hormone-type weedkillers:—

Very resistant: Practically no plants showing a reaction or being permanently affected by heavy applications.

Resistant: Practically no plants killed, although some temporary reaction may be shown to heavy applications.

Susceptible: The majority of plants killed or very severely damaged by moderate applications.

Very susceptible: Practically complete kills from light or moderate applications.

The classes cannot be regarded as distinct, because inevitably factors such as weather and soil conditions and stage and vigour of growth of the plant may cause a different reaction from that indicated.

Seedling plants are generally more susceptible to treatment. In classes "resistant at all stages of growth" it should be recognised that very young or newly-germinated seedlings of such species may be killed by treatment with hormone weedkillers.

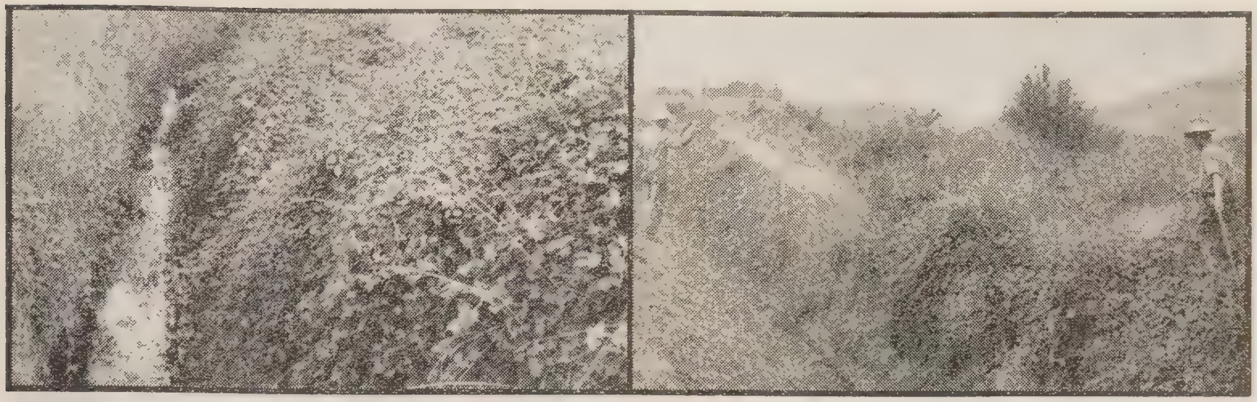
(a) ANNUAL AND BIENNIAL WEEDS

Class 1: Very resistant or resistant at all stages of growth.
Class 2: Resistant as mature plants, susceptible as seedlings.
Class 3: Resistant as mature plants, reaction as seedlings unknown.
Class 4: Susceptible.
Class 5: Very susceptible.

(a) ANNUAL AND BIENNIAL WEEDS

Class 1: Plants very resistant or resistant at all stages of growth

Black bindweed (*Polygonum convolvulus*)
Cleavers (*Galium aparine*)
Chickweed (mouse-eared) (*Cerastium glomeratum*)
Field pansy (*Viola arvensis*)
Staggerweed (*Stachys arvensis*)
Scarlet pimpernel (*Anagallis arvensis*)
Speedwell (*Veronica* spp.)
Wireweed (*Polygonum aviculare*)



Serious encroachment of blackberry on a drain (left) and spraying a section of the drain with sodium chlorate spray (right). The use of chemical weedkillers, if effective, would be of great assistance in dealing with this type of weed infestation.

Class 2: Plants resistant when mature, susceptible as seedlings

Black nightshade (*Solanum nigrum*)
Chickweed (slender) (*Stellaria media*)
Catchfly (*Silene gallica*)
Spurrey (*Spergula arvensis*)
Redshank (*Polygonum persicaria*)
Tares (*Vicia* spp.)

Class 3: Plants resistant when mature, reaction as seedlings unknown

*Fleabane (*Erigeron* spp.)
Flax (Australian) (*Linum marginale*)
Fumitory (*Fumaria muralis*)
Goatsrue (*Galega officinalis*)
Willow weed (*Epilobium* spp.)

Class 4: Susceptible plants

Burdock (*Arctium lappa*)
Fat-hen (*Chenopodium alba*)
Foxglove (*Digitalis purpurea*)
**Fennel (*Foeniculum vulgare*)
Groundsel (*Senecio vulgaris*)
**Hemlock (*Conium maculatum*)
Land cress (*Barbarea* spp.)
Red dead nettle (*Lamium purpureum*)
Storksbill (*Erodium* spp.)
Sow thistle (*Sonchus oleraceus*)
Scentless mayweed (*Matricaria inodora*)
Stinging nettle (*Urtica urens*)
**Twin cress (*Coronopus didymus*)
Wild parsnip (*Pastinaca sativa*)

Class 5: Very susceptible plants

Hedge mustard (*Sisymbrium officinale*)
Portulaca (*Portulaca oleracea*)
Shepherd's purse (*Capsella bursa pastoris*)
Wild turnip (*Brassica campestris*)
Thistle, Scotch (*Cirsium lanceolatum*)
Thistle, Nodding (*Carduus nutans*)
Thistle, Variegated (*Silybum marianum*)
Thistle, Winged (*Carduus tenuifloris*)

* Susceptible in rosette stage
** Resistant when flowering

(b) PERENNIAL WEEDS

A different classification has been adopted for perennial weeds.

Class 1: Shoot and root resistant at all stages of growth.

Class 2: Shoot is susceptible, but plant regrows from unaffected underground parts.

Class 3: Woody plants temporarily defoliated, or leaves and young shoots reacting to treatment, but plant soon recovers.

Class 4: Susceptible plants; a proportion of the plants may recover after treatment, but repeat treatment would control the weed.

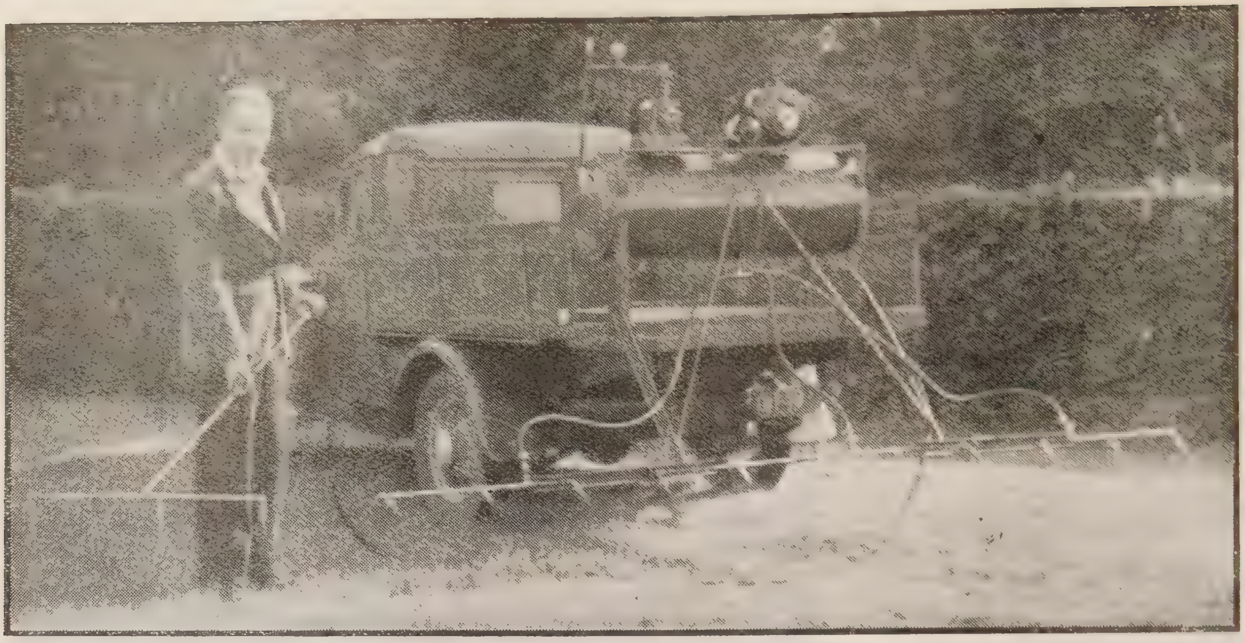
Class 5: Very susceptible plants, the majority of which would be eliminated by one treatment.

In connection with this classification, the following points should be borne in mind:

(a) Oil-based materials are generally more effective per unit of active material than water-based sprays. This is particularly the case with St. John's wort and ragwort.

(b) The classification is on the assumption that plants are treated at the most favourable season of the year and time of growth. In the plants in Class 2 the best results can usually be obtained by treating them in the early-flower stage (as mature plants) when there is the best translocation of weedkiller to the underground parts of the plant. Apart from this, plants can be considered as more susceptible as seedlings and when growth is active. It is, however, important to distinguish between true seedlings and new shoots coming up from underground roots or stems. Dormant plants in winter or in dry periods usually show least effect from treatment.

Californian thistles in a barley trial. Left—Control. Right—Treated with hormone weedkillers. Effective temporary control of this weed was secured and the suppression of Californian thistle allowed the growth of a clean crop and an increased yield of grain.



[*Douglas Elliott photo.*

Complete low-volume spraying outfit mounted on the back of a truck. There is a hand boom for spraying inaccessible places, as well as a fixed boom for pasture or crop spraying.

(c) A complete kill of susceptible and very susceptible plants may not be secured because of inefficient distribution of weedkiller. This result is most frequently seen with dust applications.

Class 1: Shoot and root resistant

Bidi-bidi (*Acaena sanguisorbae*)
*Cudweed (*Gnaphalium luteo-album*)
Elderberry (*Sambucus nigra*)
Fern (Hard) (*Paesia scaberula*)
Fern (Bracken) (*Pteridium esculentum*)
Grasses (weed and twitches) (*Gramineae*)
Marshmallow (*Althaea officinalis*)
Manuka (*Leptospermum scoparium*)
Moss
Periwinkle (*Vinca major*)
Poa aquatica (*Glyceria aquatica*)
Raupo (*Typha angustifolia*)
Rushes (*Juncus* spp.)
Sedge (*Carex* spp.)
Sorrel (*Rumex acetosella*)
Tutsan (*Hypericum androsaemum*)
Wild garlic (*Allium vineale*)

Class 2: Shoot susceptible, but plant recovers in most cases

Bladder campion (*Silene cucubalis*)
Californian thistle (*Cirsium arvense*)
Convolvulus (Field) (*Convolvulus arvensis*)
Chicory (*Cichorium intybus*)
Horehound (*Marrubium vulgare*)
Oxalis (*Oxalis* spp.)
Self-heal (*Prunella vulgaris*)
Yarrow (*Achillea millefolium*)

Class 3: Woody plants which recover quickly after treatment

Blackberry (*Rubus* spp.)
Broom (*Cytisus scoparius*)
Gorse (*Ulex europaeus*)
Sweet brier (*Rosa eglanteria*)

Class 4: Susceptible plants, but complete control unlikely with single treatment

Buttercups (*Ranunculus* spp.)
Capeweed (*Cryptostemma calendulacea*)
Convolvulus (Greater) (*Calystegia sepium*)
Daisy (*Bellis perennis*)
Docks (*Rumex* spp.)
Geraniums (*Geranium* spp.)
Heath (Spanish) (*Erica lusitanica*)
Hoary cress (*Cardaria draba*)
Mint (Field) (*Mentha arvensis*)
Monkey musk (*Mimulus guttatus*)
Pennyroyal (*Mentha pulegium*)
Ragwort (*Senecio jacobaea*)
St. John's wort (*Hypericum perforatum*)
Waxweed (*Hydrocotyle* spp.)

Class 5: Very susceptible plants

Catsear (*Hypochaeris radicata*)
Dandelion (*Taraxacum officinale*)
Hawkbit (*Leontodon hispidus*)
Hawkweed (*Crepis capillaris*)
Lupins (*Lupinus* spp.)
Plantains (*Plantago* spp.)
Watercress (*Nasturtium officinale*)

* Susceptible prior to flowering

[*Douglas Elliott photo.*

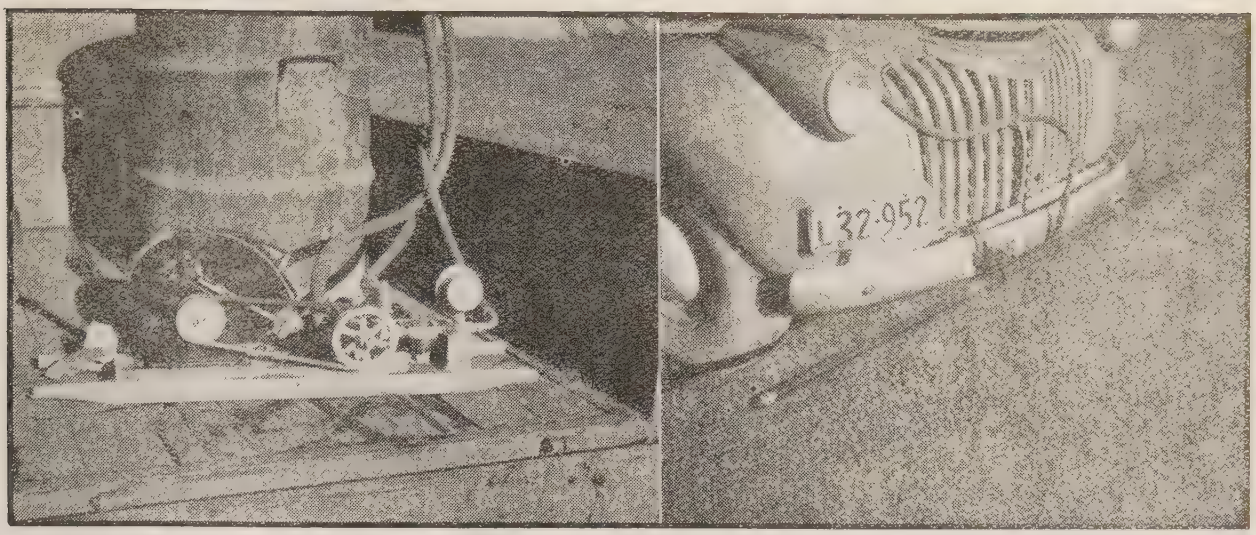
A low-volume spraying nozzle in action, showing the mist-like spray produced.

Of woody plants suckers and young growth of silver poplar (*Populus alba* var. *nivea*), crack willow (*Salix fragilis*), and elm (*Ulmus campestris*) have been killed by sprays.

D.N.O.C. Compounds

D.N.O.C. compounds are completely effective only against some annual weeds and against seedling plants of some perennial weeds. In perennial weeds it is important to distinguish between true seedlings that are just starting to grow from seeds and new shoots coming up from underground roots or stems. D.N.O.C. materials cannot kill perennial weeds because they cannot penetrate the roots from which fresh shoots arise. In spite of this sufficient control of the aerial parts of the plants may be secured against weeds such as Californian thistle in crops to enable the crop to get away and compete successfully with any regrowth of weeds.

In view of the foregoing, D.N.O.C. compounds are only of restricted use



A cheap low-volume spray outfit. A 5/8 h.p. engine mounted on the back of a truck drives a ½in. gear pump which delivers 60 gallons per hour of the spray solution to a boom on the front of the truck. Each of the four wide-angle nozzles sprays 3ft. wide at the rate of 15 gallons per hour, and the outfit, travelling at 15 miles per hour, will spray 20 acres at 3 gallons per acre in an hour.

against perennial weeds in pastures. Most of the weeds classed as susceptible are **resistant when mature.** The list is incomplete, as only a relatively-small amount of work has been done with the D.N.O.C. materials.

Weeds have been divided into four classes, namely:—

Class 1: Resistant at all stages of growth.

Class 2: Susceptible only when young.

Class 3: Susceptible at most stages of growth.

Class 4: Seedlings and shoots killed, but underground parts not affected.

Class 1: Resistant weeds

Chickweed (Slender) (*Stellaria media*)
Chickweed (Mouse-eared) (*Cerastium glomeratum*)
Fumitory (*Fumaria muralis*)
Grasses (all) (*Gramineae*)
Stinging nettle (*Urtica urens*)
Scarlet pimpernel (*Anagallis arvensis*)
Sorrel (*Rumex acetosella*)

Class 2: Weeds susceptible only when young

Black nightshade (*Solanum nigrum*)
Clovers (very early stage) (*Trifolium* spp.)
Fat-hen (*Chenopodium album*)
Speedwell (*Veronica* spp.)
Spurrey (*Spergula arvensis*)
Willow weed (*Epilobium* spp.)
Wireweed (*Polygonum aviculare*)

Class 3: Weeds susceptible at most stages of growth

Black bindweed (*Polygonum convolvulus*)
Dead nettle (*Lamium purpureum*)
Lupins (*Lupinus* spp.)
Shepherd's purse (*Capsella bursa pastoris*)
Scotch thistle (*Cirsium lanceolatum*)
Wild turnip (*Brassica campestris*)

Class 4: Shoots killed or damaged severely, but roots not affected

Californian thistle (*Cirsium arvense*)
Catsear (*Hypochaeris radicata*)
Chicory (*Cichorium intybus*)
Convolvulus (Greater) (*Calystegia sepium*)
Hawkbit (*Leontodon hispidus*)
Hawkweed (*Crepis capillaris*)
Hoary cress (*Cardaria draba*)

Sodium Chlorate and Power Kerosene

It is outside the scope of this article to give detailed information of the effect of sodium chlorate and power kerosene on individual weed species. Generally both materials will destroy the aerial parts of the majority of plants, including grasses, and they have been used to clean sites completely of plants. The usefulness of sodium chlorate in the control of ragwort is widely known. However, the fact that chlorate treatment rarely completely suppresses regrowths of ragwort illustrates the important point that plants which can send up fresh shoots from unaffected roots after the original shoots have been destroyed are rarely completely controlled by such materials. Very heavy dressings of sodium chlorate will, however, penetrate the soil and sterilise it against all plant growth for an appreciable period.

Power kerosene has particular application as a spray on carrot crops, which are resistant to this material. Apart from this use, neither power kerosene nor sodium chlorate is really selective in action. Consequently they cannot be used on crops or as a widespread application on pastures without causing damage to economic crop or pasture species.

Low-volume Spray Equipment

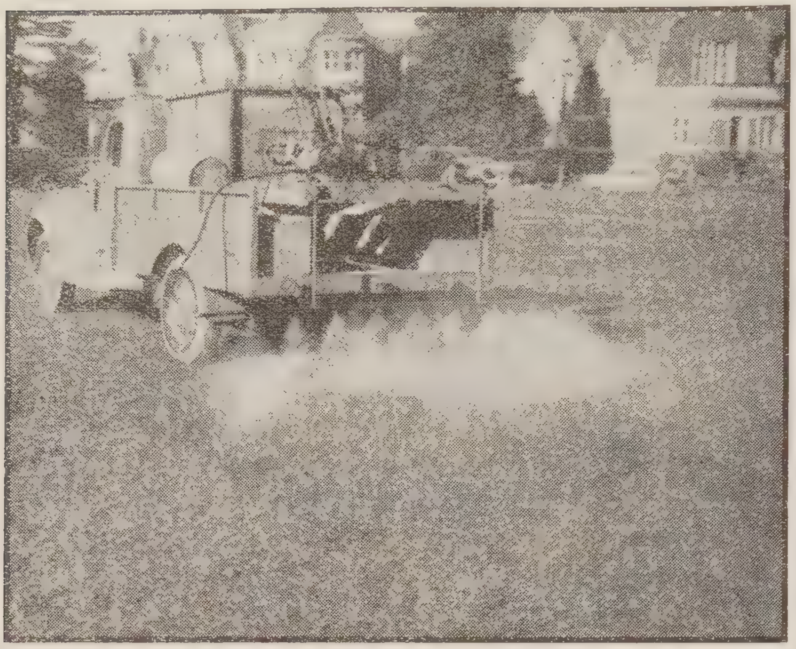
The application of chemical weedkillers in the field is an important aspect of weed-control work. The usefulness of dust applications has been discussed, but in general it may be said that dusts have given disappointing results in comparison with sprays. The recent development of low-volume spraying has overcome many of the difficulties associated with spraying, and in consequence it is unlikely that weedkiller dusts will be widely used in the future.

It has been usual to apply weed-control sprays with high-volume, high-pressure mechanical sprayers. However, with the realisation that the hormone weedkillers were effective at high concentrations, attention was given to the adoption of spraying low volumes at low pressure using high concentrations of the spray solutions.

These low rates of application are possible only as a result of the introduction of low-pressure nozzles which have been developed in the United States in the past 2 years. The low-pressure nozzle is designed to give a fine spray of even particle size at pressures as low as 20 to 30lb. per sq. in. The orifice diameter of such nozzles is in the region of 20 thousandths of an inch for the smaller sizes, which discharge at rates as low as 1 gallon per hour for each nozzle, so that it is possible to spray at rates as low as 1 gallon per acre.

There are several methods of supplying the spray solution to the nozzle at these low pressures, and because the low-volume sprayer uses small quantities of water it has been possible to design a sprayer which may be entirely tractor mounted. Large-capacity tanks are not required and the weight and size of the sprayer may be considerably reduced. The spraying equipment required is consequently much less expensive.

Low-volume spraying may be summarised in comparison with high-volume spraying as having the advantages of being less expensive, less water is required, there is less weight and reduced crop damage, faster spraying may be achieved, and the



A high-volume, high-pressure sprayer mounted on a truck and fitted with a boom with 10 nozzles. This machine applies spray at the rates of 50 to 100 gallons per acre.

possibility exists of using spraying methods in country difficult to cover with a machine or where available water supplies are limited. The use of a knapsack sprayer in hill country is not out of the question when one fill of the sprayer carries sufficient material for 1 or 2 acres.

Certain disadvantages are associated with low-volume spraying, the chief of which is increased spray drift of the fine mist-like spray produced. Spray materials must be completely dissolved or they will not pass through the nozzles. This means that certain weedkillers applied as suspensions cannot be applied through low-volume nozzles. And, last, with weeds at the base of taller crops, or with bushy plants, where the spray needs to be applied with considerable force to reach all parts of the plants or to the weeds at ground level, satisfactory penetration is unlikely to be secured with low-pressure spraying.

Differences Between Preparations

In general, great differences have not been found between the different commercial preparations. The oil-based sprays may be less affected by rain soon after application and may be more effective in dry conditions. Such sprays have greater penetrating power and tend to be more effective per unit of active material, but they are less selective in action and may damage crop plants and clover species when water-based sprays do not.

The M.C.P. compounds persist longer in the soil than the 2, 4D materials; 2, 4D compounds applied at a very heavy rate in a greenhouse trial were destroyed in 4 to 6 weeks, while M.C.P. compounds have been known to persist for several months. Seeds are apparently resistant to hormone materials until germination commences.

Cleaning Spray Equipment

The water-based sprays have been found to be satisfactorily removed by four **thorough** washings of spray equipment with water followed by soaking overnight with warm dilute ammonia or hot soap solution. **On the other hand oil-based hormone weedkillers were practically impossible to remove satisfactorily** by a large number of treatments. The only effective method was soaking with 1 per cent. activated charcoal (norite) suspension after any free hormone material had been removed by repeated water rinses. However, it was found after such treatment that **water left in the pump for a week picked up sufficient 2, 4D to affect tomatoes.** However thoroughly spray equipment has been cleaned after using hormones, it should be rinsed through again with clean water before using it again on very susceptible crops.

The only safe method is to have separate spraying equipment for use with the oil-based hormone sprays.

General Conclusions

The reaction of a number of crop and pasture plants and weeds to hormone-type weedkillers, D.N.O.C. materials, sodium chlorate, and power kerosene has been briefly described. Emphasis has been placed on the fact that the information given is based on the results of research work still in progress, and is liable to amendment from time to time. Trials are being continued on an extensive scale, however, and with increasing use of the materials by farmers, knowledge of the practical applications of chemical weed control will rapidly increase.

Weed control with chemical weedkillers should be regarded not as a means of avoiding clean farming practice, but as a means of obtaining clean crops and pastures when circumstances have made these difficult or impossible to attain by normal farming practices. In many cases the cost of using chemical weedkillers makes them uneconomic to apply except to high-value crops. Information is lacking as to the precise benefits in terms of crop and pasture yields from weed spraying in New Zealand. Though the elimination of weeds must in itself result in improved production of pastures and crops, this must be weighed against the cost of such improvement and, with some crops, the possibility of direct damage to the crop plant itself.

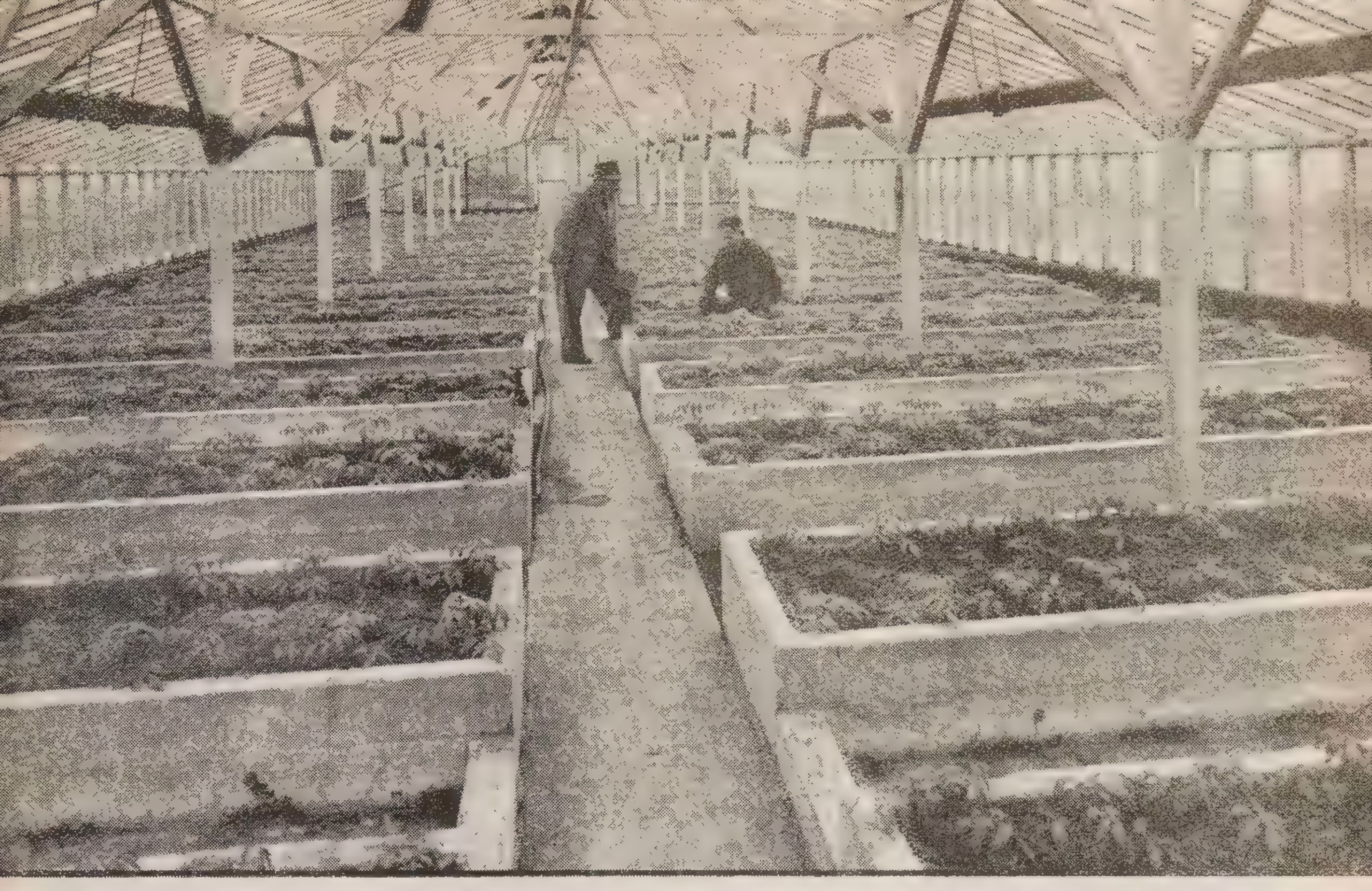
Weed control by chemical means offers considerable promise as an assistance to farmers in their fight against weeds, but it should not be taken for granted that the weed problem is solved nor that chemical means of weed control in any way supersede the well-established practices associated with clean farming.

Weather Information During Haymaking

HAYMAKING and silage-making operations will soon be under way in many districts and one of the most important factors in the success of these operations is the weather. In this connection farmers are reminded that the Meteorological Office provides a special service for farmers. A request telegram to "Weather," Wellington (the telegraphic address of the Meteorological Office) will receive a brief reply, sent "Collect" to the farmer seeking a special forecast.

In cases where the name of the office of origin of the telegram does not adequately indicate the situation of the farm a brief reference to location is needed. For example: "Cloudy Valley, 5000ft." Farmers should avoid vagueness in their requests—they should ask for "Prospects for rain, 15th and 16th, Smith, Tauranga;" not, "Please send weather prospects next few days. Smith, Tauranga."

The period of the validity of most forecasts is normally taken to be 24 to 36 hours, and though under favourable weather conditions this can sometimes be extended up to 3 days, any longer period must be regarded as too uncertain for practical use.



TOMATO CULTURE IN TROUGHS UNDER GLASS

By J. D. GALLETLY, Horticultural Inspector,
Department of Agriculture, Wellington.

TO overcome some of the difficulties associated with the important and profitable industry of growing out-of-season tomatoes in glasshouses in Canterbury's cold winter and early spring, many growers have adopted the system of growing the plants in troughs. The construction and layout of glasshouses for the trough method of culture and some of the advantages of the system are described in this article.

THE growing of out-of-season tomatoes in glasshouses is an important industry in Canterbury. Local growers supply not only the Christchurch markets, but also the bulk of the requirements of Otago, Southland, and the West Coast. Some 400 growers are wholly or partly engaged in the industry, and it is estimated that the annual value of produce grown is about £250,000.

Tomatoes thrive naturally in warm climates and there is considerable difficulty in growing them successfully in Canterbury's cold winter and early spring. Growers aim at developing the fruit as early as possible, because the earlier it can be marketed the better the price. Consequently they set out plants in heated houses from June onward. Dull conditions often rule at that time and temperatures rarely begin to rise until late in August. Artificial heat is necessary until October.

There are indoor tomato-growing units in all parts of Christchurch and suburbs. In the main, good judgment has been exercised in selecting sites, but in many instances houses have been erected in areas where soil and drainage conditions are unsatisfactory. As the city is situated on the level expanse of the Canterbury Plains and is little above sea level, the water-table, influenced by melting snow which swells adjacent rivers, in early spring rises close to the surface in many areas. This adds considerably to the difficulty of growing tomatoes, as wet soil warms slowly and cold soil conditions, besides retarding root development, render the root system susceptible to infection from numerous soil organisms which are unable to attack a healthy, strong-growing plant.

To overcome these and other difficulties the system of growing tomatoes in troughs has been adopted by many Canterbury growers. Some of the advantages of this system are as follows:—

Control of Disease

Almost all growers now change or sterilise their glasshouse soil, and this work is facilitated by the use of troughs. Where the soil is changed the amount that must be shifted is reduced by approximately 40 per cent., and where sterilising is practised the saving in labour and materials used is approximately the same.

Root diseases are often spread among tomatoes growing on the floor of the house by watering and by being carried on the boots of workers. With the trough system the disease cannot spread beyond the trough affected. With the totally-enclosed trough complete control of soil insect pests such as eelworm can be obtained.

Heating

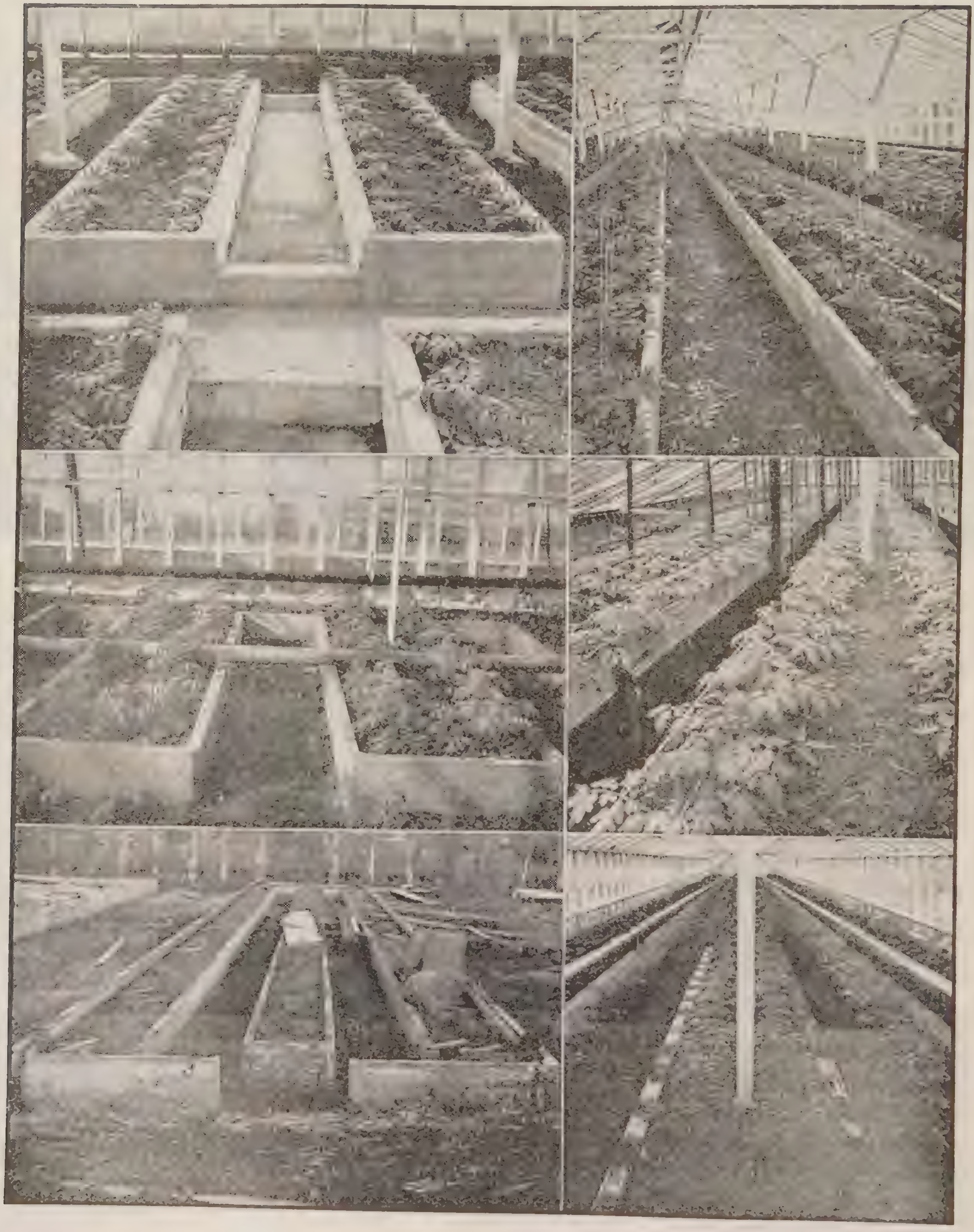
It is difficult to heat such a large body of soil as that on the floor of a glasshouse. Apart from the beneficial effect of the correct soil and air temperatures on the growth condition of the plant, they are important factors in the setting of the flowers. Trials indicate that soil temperatures in troughs 1ft. above the ground are several degrees higher than that of the soil at ground level.

Early Ripening

Growers with experience of troughs consider that heavier crops of early fruit can be obtained by this method than by planting on the floor of the house.

Heading photograph by Green and Hahn Ltd

CULTURE OF TOMATOES IN TROUGHS UNDER GLASS



[Photographs, except those at middle left and bottom left, by Green and Hahn Ltd.

. . . TROUGH METHOD OF TOMATO CULTURE

There is often difficulty in achieving setting of the first and second trusses of plants growing on the floor of the house in winter and early spring, and it is these trusses that produce the earliest and most valuable fruit.

The better drainage and warmer soil in troughs enable the plants to get away to a good start and increase the chances of a full set.

Watering and Feeding

Although drainage is better in troughs, watering requires no less care, and usually more water is required than when plants are growing on the floor of the house.

The illustration at top left on the opposite page shows a system of watering that has given good results. The type of trough illustrated has a concrete bottom and sides with drainage vents spaced along each side at ground level. Short paths in the middle of each pair of troughs are of concrete with low walls at each end to convert the path into a tank. The paths separating the pairs of troughs are left unfloored and surplus water drains through and seeps away in the unfloored path.

As most growers apply their fertilisers when watering, troughs are again an advantage, because less fertiliser is required for the smaller volume of soil in troughs.

Number of Plants

Approximately the same number of plants are grown in houses equipped with troughs as are grown in houses of similar size in which the plants are set out in the ground. For example, the 100ft. x 30ft. house illustrated at the top of page 445 is planted with 1200 plants, which in Canterbury is the normal planting for a house of that size when planted out in the ground.

Plants are trained out over the paths, thus allowing space for air to circulate and light to penetrate between the rows.

Type of Trough

The type of trough erected is determined largely by the direction in which the glasshouse is facing. Growers consider that heavier crops and earlier fruit are grown where the rows of plants run north and south, as this allows sunlight to penetrate the rows. Therefore they erect long troughs running the full length of houses whose ends face north and south, and short troughs at right angles to the centre path in houses whose ends face east and west.

At the top of page 445 a 100ft. x 30ft. glasshouse equipped with concrete troughs is illustrated. The inside measurements of the troughs are:—Depth 1ft. 3in. and length 13ft. 6in. Walls and bottoms are 3in. thick, walls being reinforced at the corners with No. 8 wire. A 6in. space is left at each side of the house to allow room for the heating pipes. The centre path and short paths are 2ft. wide.

There are 20 troughs on each side of the house, each trough holding 30 plants in two rows of 15, in all 1200 plants.

The cost of materials required to install troughs in this house amounted to £60, the work being done by two men in 6 weeks.

In the close-up view of troughs in the same house at top left on the opposite page the method of watering already described is illustrated.

Long concrete troughs running the length of a 100ft. x 30ft. house are illustrated at top right on the opposite page. These troughs have no concrete bottoms and the walls are 1ft. above and 1ft. below ground level. There are six troughs to the house and the troughs are 2ft. 6in. wide, inside measurement. Paths between troughs are 2ft. 6in. wide and for ease of working a pathway runs across the house 30ft. from each end. Trough walls in the house illustrated are 2in. thick. These have been satisfactory, but 3in. walls would eliminate risk of damage from knocks, etc.

Two rows of tomatoes are planted in each trough, 96 plants to the row, in all 1152 plants to the house. Cost of materials for this type of trough amounted to approximately £40 and the labour involved was 27 days' work for two men.

In another type of trough illustrated at middle left on the opposite page provision is made for a single row of plants along each side of the house. There are no concrete bottoms to these troughs, and the walls are let 1ft. into the ground.

At middle right on the opposite page is illustrated a type of trough not in common use in Canterbury, but one that has proved itself over the years by producing even plants yielding heavy crops of early-maturing fruit. Last year the average weight of fruit taken from a group of houses equipped with this type of trough was in the vicinity of 9lb. per plant. The principle embodied here is the use of bottom heat. The troughs are raised on legs 1ft. 6in. above the floor and a flow-and-return pipe travels under each trough from the main heating pipes at one end of the house. The troughs are 1ft. 6in. wide and the sides are constructed from 9in. x 1in. timber well-seasoned and treated before erection. The bottoms are of galvanised iron. The troughs illustrated have been in use for 18 years and are still in good condition.

The 100ft. x 15ft. house shown in the course of construction in the illustration at lower left on the opposite page has three troughs running the full length of the house. (An inside view of such a house planted out is shown at bottom right on the opposite page.) This type of house, a popular one in Canterbury, has a trough along either side and one down the centre of the house. Troughs have no concrete bottoms and are 3ft. wide, inside measurement, with 1ft. 9in. walls set 6in. into the floor of the house. The walls are 3in. wide at the top, widening out to 4in. at ground level. Paths are 2ft. 6in. wide.

This type of house carries 580 plants; there are 2 rows of 100 plants each in the outside troughs and 2 rows of 90 plants each in the shorter centre trough.

The system of trough culture of tomatoes has proved itself in Canterbury and could be used to advantage in other parts of New Zealand where soil conditions are unfavourable to early growth or where a saving of labour and material costs in soil changing, soil sterilising, or feeding of plants is sought.

☆

DAIRY PRODUCE GRADED FOR EXPORT

THE following figures showing quantities of dairy produce graded for export during September and for the 2 months ended September 30, 1948, with comparative figures for the same month and 2-monthly period of last year, have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:—

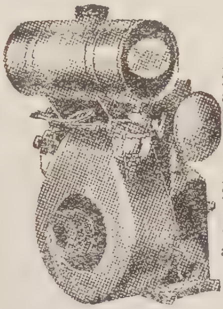
BUTTER—	Tons			Tons	
Period	Creamery	Whey	Total	Percentage inc. or dec.	Total in store at end of mth.
September, 1948	12,980	230	13,210	+ 6.403	13,874
September, 1947	12,209	206	12,415		14,164
Increase or decrease ..	+ 771	+ 24	+ 795		— 290
For 2 mths. ended 30/9/48	19,855	309	20,164	+ 9.278	—
For 2 mths. ended 30/9/47	18,182	270	18,452	—	—
Increase or decrease	+ 1,673	+ 39	+1,712	—	—

CHEESE—	Tons			Tons	
Period	White	Coloured	Total	Percentage Inc. or dec.	Total in store at end of mth.
September, 1948	6,422	—	6,422	+ 17.147	7,821
September, 1947	5,482	—	5,482	—	6,264
Increase or decrease ..	+ 940	—	+ 940	—	+ 1,557
For 2 mths. ended 30/9/48	7,642	—	7,642	+ 18.609	—
For 2 mths. ended 30/9/47	6,443	—	6,443	—	—
Increase or decrease ..	+ 1,199	—	+ 1,199	—	—

If these figures are converted into butterfat equivalent, there is an increase of 10.544 per cent. in butterfat graded for the 2 months compared with the corresponding period of the preceding season. It should be noted that the above figures refer only to butter and cheese graded for export, and that owing to diversions which take place from time to time, they do not necessarily reflect actual trends of production on the farm.

POWER . .

- *For Any Purpose!*
- *Wherever You Want It!*
- *Whenever You Want It!*



VILLIERS
Mark 10, 20, and 25—also Mark 20 and 25 with 3-1 reduction gears.
BRIGGS AND STRATTON
Models N, B and 22.
JOHNSTON
'Iron Horse'—⅝ and 1.34h.p.
PILOT—2h.p.

JOHN BURNS & CO. LTD. have a complete range of power units for every farming need—compact, reliable and economical to run. **Call, write, or phone us for Full Details.**

John Burns & Co. Ltd.

Head Office: Customs Street, East, Auckland.
Also at Whangarei, Wellington, Christchurch, Greymouth, Gisborne, New Plymouth, Nelson and Timaru.

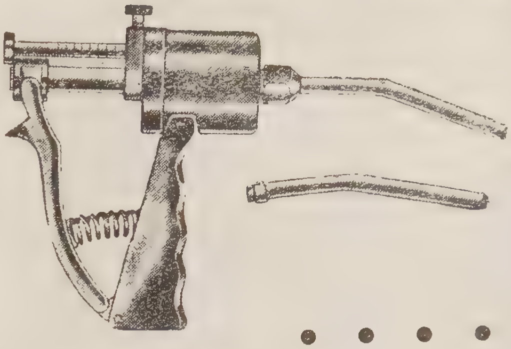
COMPLETE HOUSEHOLD REMOVALS

Rail-Air for Inter-Island Transfers

Packing and transporting furniture and household effects are tasks for experts—jobs at which the Railways excel. Their specialist rail and road organisation and their Cook Strait rail-air link assures dependable service and makes household removals, from and to anywhere in New Zealand, a speedy, money-saving operation. If you've a house-to-house move in prospect, get a quotation from your nearest Stationmaster. You'll find it will pay.

Reliable — Quick Economical

DRENCHING . . .



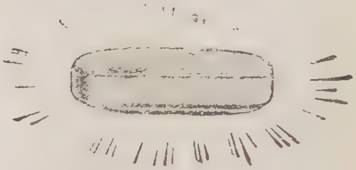
"SAYERS" 2oz, "DRENCHALL" PISTOLET

Dose range 60 c.c. in 5 c.c. graduations. Ideal for PENTHOTHIAZINE. Delivers a 2 oz. dose in one operation.

● ● ● ● ●

PHENOTHIAZINE PELLETS

A product of Imperial Chemical Industries Ltd. These 5 gramme pellets are administered by a balling gun and have been enthusiastically received.



AVOIDS STAINING DURING ADMINISTRATION. NO WASTE . . .
Available From

DALGETY & CO. LTD.

(Incorporated in England) **ALL BRANCHES.**

By Appointment

THE ENGLISH

ATCOSCYTHE

New Post War Model.

The 100 per cent. Power Propelled Sickle Type Agricultural Mower—

Cuts Fern, Bracken, Blackberry, Weeds, Thistle, Light Scrub, Long Grass, Greenfeed, Hay, Scrub, etc.

This remarkable Labour Saving Machine is fitted with 2 independent clutches—pneumatic tyre—36" cutter bar and will work anywhere. Will bring into productivity overgrown land—flat or hillside—cut along creek banks or roadsides and do all general mowing.

Dairyfarmers — Orchardists — Poultrymen — General Farmers — Public Bodies and other mowing equipment users, write for details to—

Sole N.Z. Distributors ATCO Mowing Equipment.

IVORY BROS. LTD.

EGMONT ST. WELLINGTON. BOX 1321.

SEED PRODUCTION IN NEW ZEALAND

Perennial Ryegrass

By E. G. SMITH, Fields Instructor,
Department of Agriculture, Rangiora.

ONE of the most useful and popular grasses for New Zealand soils of high fertility, perennial ryegrass *(Lolium perenne)* may be sown profitably on a wide range of country provided that clovers form a good proportion of the sward. Where vigorous clovers can be grown, so can perennial ryegrass. Factors contributing to its value are its excellent seed production, its ease and speed of establishment from seed, its high production of good milk-producing and fattening feed (particularly in spring, when feed is at a premium), its ability to withstand hard grazing, and its permanence under suitable conditions.

PERENNIAL ryegrass is a medium-sized grass, with a hairless blade the lower surface of which is shiny. The ligule is short and square cut, and the base of the plant is red. Perennial can be distinguished from Italian ryegrass by its oval sheath in comparison with the round sheath of the Italian. The strong awning of Italian and the absence of awning in perennial is an obvious difference at the flowering and seeding stages.

Place in New Zealand Farming

Perennial ryegrass is the basic component of most New Zealand pastures where the area is intended to remain in grass for more than 3 or 4 years. It is highly nutritious and supplies useful grazing on a wide range of soil types, its productivity being limited by an excess of moisture or by low soil fertility and excessive dryness. Under suitable conditions this grass is quick to establish, tending to smother weed growth and supply early grazing.

Perennial ryegrass provides early spring feed and once established thrives under hard grazing. Growth is encouraged by heavy stocking with resultant tramping and building up of soil fertility, this fact being demonstrated by the prolific perennial ryegrass growth round gateways and on camping grounds. However, unless conditions of soil and climate are ideal, midsummer production is relatively low.

Perennial ryegrass seed.

Perennial ryegrass is the main component of New Zealand's high-producing swards.

A well-drained soil of medium fertility is most favourable for the growth of a perennial ryegrass seed crop. Very high fertility may result in lodged crops and on the poorer soils plants are unthrifty and of low yield.

Strains of Perennial Ryegrass

During the farming history of New Zealand a number of widely-differing strains of perennial ryegrass has been developed. The system of seed production practised for many years in districts such as Hawke's Bay and Poverty Bay, where seed was harvested from old pastures, was conducive to the development of the better strains of perennial ryegrass.

In Canterbury and Otago, where Italian was sometimes sown with perennial ryegrass, cross-pollination between the species occurred and, in the absence of any factors which eliminated the poorer types, general deterioration in type took place. The greatest proportion of the seed was harvested from 1-year-old pastures, and the seed crop was therefore taken before the poor strains had died out. That accounts for the old belief, not borne out by fact, that good seed cannot be harvested from young pasture.

Provided that no volunteer growth has occurred, there is no reason why seed from a first-year stand of Certified perennial ryegrass should not be of quality equal to that taken at a later harvest.

The certification of seed from naturally-developed strains was only a stepping stone to something better. By selection and breeding carried out by the Grasslands Division of the Department of Scientific and Industrial Research at Palmerston North, a highly-improved strain has been evolved. The ability of this strain to persist and recover quickly after hard grazing, and palatability and high leaf production, are among its outstanding characteristics.

Seed Certification

The object of seed certification is the guarantee to the purchaser of trueness to type. The scheme is based on the identification and isolation of a truly perennial and leafy type. The methods employed in its identification include field inspection of growing crops, plot testing, and laboratory testing of seed samples.

QUANTITIES OF PERENNIAL RYEGRASS SEED CERTIFIED (bushels)

District	1929-30	1930-31	1931-32	1932-33	1933-34	1934-35	1935-36	1936-37	1937-38	1938-39	1939-40	1940-41	1941-42	1942-43	1943-44	1944-45	1945-46	1946-47
Auckland			88	30		860	447	525	269		337							
Poverty Bay	736	4,372	12,761	16,621	11,858	12,733	14,661	4,419	10,171	17,483	24,021	17,051	12,792	8,126	13,191	14,128	28,657	56,444
Hawke's Bay	15,754	27,540	45,270	80,349	46,406	44,211	67,898	43,616	60,071	61,524	86,961	115,410	70,262	60,347	133,960	100,739	106,613	363,303
Wanganui				1,544	932	172				897	694	49	866	486	1,017	369		1,096
Manawatu		1,944	2,659	21,649	16,902	28,909	37,671	8,104	13,504	15,664	13,667	36,931	16,286	9,345	25,956	17,974	6,821	24,413
Wairarapa			73	4,174	1,056	4,456	5,169	762	1,925	840	331	4,577	2,493	2,409	7,377	9,444	8,007	14,251
Nelson			26													1,268	2,927	3,566
Marlborough		376	482	1,454	90	1,489	710	773	127	487	901	5,689	6,888	4,059	6,691	5,148	10,522	12,650
North Canterbury ..		4,632	8,504	42,232	10,336	32,479	63,441	21,073	4,503	6,928	4,710	14,897	13,039	14,061	30,369	26,995	48,617	106,760
Christchurch	Included in North Canterbury								6,906	39,289	25,816	50,304	61,447	31,566	69,892	46,703	109,260	243,997
Mid-Canterbury ..			674	9,965	3,170	12,358	20,920	13,917	4,287	21,728	23,687	35,750	38,597	26,200	51,208	59,996	86,256	94,760
South Canterbury ..		1,100	801	20,521	4,862	8,104	16,037	11,747	6,328	20,093	20,639	68,006	119,103	69,422	136,383	94,753	103,670	66,960
Waimate	Included in South Canterbury																11,424	8,086
North Otago				6,989	3,380	6,371	4,624	4,619	942	8,063	7,905	20,820	13,537	8,430	14,048	4,437	11,543	8,666
Central Otago	564	485	1,083	8,156	6,010	4,350	6,442	4,292	1,279	6,342	2,772	2,760	2,546	3,146	5,243	4,852	7,997	16,731
Maniototo	Included in Otago or Central Otago									110	919	159	372	605	523	1,028	2,985	1,250
Otago		2,894	2,210	1,182		1,474	5.287	3,358	18	4,049	3,163	6,854	2,397	4,879	5,092	9,746	6,254	11,388
South Otago	Included in Otago or Western Southland								722	404	298		383	2,623	764	1,602	709	227
Eastern Southland ..	Included in Western Southland								7,107	3,826	18,972	15,722	2,731	8,900	8,173	2,421	1,028	2,817
Western Southland ..		1,734	6,005	7,457	13,573	23,577	35,259	12,190	21,005	5,705	16,722	9,768	2,134	5,478	8,990	7,979	6,111	12,373

When inaugurated the certification scheme applied to strains of perennial ryegrass that had developed naturally in districts such as Hawke's Bay and Poverty Bay. Many of the perennial ryegrass paddocks in those districts had been down for more than 40 years, with the result that the short-lived strains had died out. The scheme was then based on seed from these areas, but now the improved strains raised by the Grasslands Division form the basis. These stocks are grown on contract to the Department of Agriculture by approved farmers, and from these nucleus contract areas Certified Government Stock seed is harvested. This seed is distributed to farmers through merchants each year. Areas sown with Government Stock seed are used primarily for seed production, and from these areas comes Certified Pedigree seed, which in turn is eligible to produce Certified Mother seed.

All paddocks sown with Certified Government Stock or Pedigree seed which are entered for certification are inspected during the growing season by officers of the Department of Agriculture to determine whether any contamination of the strain has taken place. All sacks containing the produce of areas passing this inspection are branded and sealed before leaving the paddock for machine dressing. Machine dressing of the seed is supervised, and an official sample of the line is forwarded to the Seed-testing Station for purity and germination tests.

Areas sown with Mother Seed, Permanent Pasture seed, or uncertified seed are not inspected, but may be entered for certification under a laboratory test. After being machine dressed the seed is held under temporary seal while an official sample is forwarded to the Seed-testing Station for examination under an ultra-violet light. Under this the germinated seed of poor strains of perennial ryegrass shows a fluorescence which is not evident in the case of good strains. If as a result of this test the seed proves to be of the requisite standard, the sacks are tagged and sealed as Certified Permanent Pasture seed. If it does not reach this standard, the temporary seal is removed.

All lines of Certified Perennial ryegrass seed must attain a minimum purity of 97 per cent. before being finally sealed and tagged. A purity and germination certificate covering each line is issued by the Seed-testing Station.

Palatability

The importance of sowing grass in association with suitable clovers cannot be over-emphasised. Nitrogen supplied to the soil by vigorous clover plants ensures the growth of succulent perennial ryegrass, which, if well controlled, is relished by stock. For some years Certified perennial ryegrass found little favour in the South Island; farmers claimed that it was extremely unpalatable to stock, that being attributed to the strain of plant. However, experience has shown that the inclusion in the mixture of a good strain of white clover, coupled with judicious stocking and topdressing, will solve the problem of unpalatability.

In the early days of seed certification the sowing of pure stands of perennial ryegrass for seed production was common. This practice is still sometimes adopted on North Island properties, but in the South Island some clover is always sown. The rapid increase in the use of lime throughout Canterbury has made possible vigorous growth of good strains of white clover where previously acid soil conditions and low fertility limited its growth. Good strains of well-managed perennial ryegrass are not unpalatable to stock.

Seed Production

Trends in seed production during the past 20 years are evident from the table on this page. A marked over-all increase in the acreage and the quantity of seed harvested has occurred, chiefly because of a comparable increase in production in the Canterbury Land District. This stimulation of production may be attributed in large measure to the increasing use being made of the better strains and the resultant raising of the quality of Canterbury-grown seed from the low level existing in earlier years. Under the certification scheme Canterbury-grown seed, instead of being dominantly of the poorest regional strain, has become equal in quality to seed from other districts, and the type of farming practised has made full use of this improvement.

By contrast, perennial ryegrass seed production in Southland has fallen markedly. That can be accounted for by the relative susceptibility to blind seed disease of the superior strains in comparison with the more resistant regional strains evolved in this area. Because of climatic conditions seed crops in many parts of Southland suffer almost every season from blind seed disease infection, making the harvesting of seed of superior strains a risky procedure.

Production in the Otago district has increased, reflecting primarily the greater quantity of seed harvested in the drier areas, as the wetter localities are comparable with most of Southland for infection by blind seed disease.

In the North Island some fluctuation is shown, in the main because of seasonal conditions affecting the acreage which could be devoted to seed production. In general, an increase in area is apparent in all the main districts.

Seed Mixtures

Though seed production may be intended, the primary aim in sowing most pastures should be grazing, and for that reason the method of establishing perennial ryegrass for seed production follows very closely that for ordinary grazing pastures. The rate of seeding and the components of the seed mixtures vary with the requirements of the area. Seedings as low as 10lb. of perennial ryegrass and 1 to 3lb. of white clover per acre have given excellent results on well-prepared land; on the other hand, seeding rates of more than 2 bushels per acre with clovers may be warranted, particularly to control weed growth. In general, 20 to 30lb. of perennial ryegrass with 2 to 3lb. of white clover is advocated, the heavier seeding on the better land. Crested dogstail, red clover, or subterranean clover may be included in the mixture if desired.

A perennial ryegrass seed crop being inspected for certification.

Where the area is intended for seed production Italian or short-rotation ryegrass must not be included. It is also desirable that different grades of Certified seed should not be sown in one paddock.

In Hawke's Bay perennial ryegrass is frequently sown pure for seed production, as it has been found that in that district the better types of white clover smother ryegrass plants. In Canterbury the general practice is to sow 20 to 25lb. of perennial ryegrass with 2 to 3lb. of white clover and to harvest perennial ryegrass seed in the first season and white clover seed in the second.

Establishment

Methods of establishing perennial ryegrass vary. In Hawke's Bay excellent results are obtained by sowing 2 bushels per acre following a crop of either peas or potatoes. The land is ploughed directly after the crop, then well worked and rolled before the seed is broadcast in late March or during April. Harrowing and a final rolling complete operations.

In Otago and Southland the seed is seldom sown in autumn, the most popular method of establishment being spring and summer sowing with either turnips or rape.

In Canterbury, sowing in spring under wheat, with rape or turnips, or with a spring-sown cereal all have the merit of reducing costs. A common practice is to plough after a cereal crop has been harvested and sow the pasture mixture in late autumn. Though any of these methods of establishment may produce a satisfactory pasture, such practices have certain disadvantages and inferior pastures must often result. When sown under wheat in spring, establishment of perennial ryegrass is poor in a dry season, and in a wet one the wheat crop may be sufficiently heavy to smother grass growth. Even under normal conditions pastures sown under wheat are usually clover dominant. Growth of ryegrass sown with oats or barley is frequently smothered, though reasonable results are usually obtained from a seeding with linseed or mustard. If the pasture mixture is sown with rape, turnips, or chou moellier, the heavy concentration of stock during the feeding of the supplementary crop is likely to result in injury to the young pasture plants; that is particularly noticeable when rape is fed off during a dry period.

Neither perennial ryegrass nor clover plants can make their best growth when they have to compete with other crops for soil moisture and plant nutrients.

When land is ploughed after a cereal crop, soil fertility is often low and, because of the time of harvest, it is found necessary to resort to hasty cultivation. Time is too short to allow taking full advantage of weathering of the soil, an important feature in the preparation of the seed-bed. Further, the seed-bed is usually not prepared until late in the season. All those factors combine to retard germination and establishment, and thereby increase the risk of frost lift during winter.

The most reliable method of establishing perennial ryegrass in Canterbury is undoubtedly to sow in January or early February after a summer fallow. During the fallow moisture has been conserved and weed growth checked, and the soil is warm in early autumn, ensuring rapid germination and vigorous growth. Thus, under normal conditions, useful grazing for sheep during winter and early spring can be confidently expected.

ACREAGES OF PERENNIAL RYEGRASS HARVESTED FOR SEED

Year		Gisborne	Hawke's Bay	* Rest of North Island	Nelson	Marlborough	Canterbury	Otago	Southland	Total
1927-28	..	118	1,582	553	8	84	7,920	1,930	8,855	21,050
1928-29	..	436	2,165	524	14	94	5,646	2,690	9,967	21,536
1929-30	..	911	2,329	653	7	124	7,513	2,862	9,937	24,336
1930-31	..	1,755	3,016	1,257	21	218	12,436	3,776	13,354	†35,851
1931-32	..	2,224	4,917	1,075	17	265	8,800	2,117	6,443	25,558
1932-33	..	3,381	9,917	4,218	35	826	32,966	6,020	11,629	68,992
1933-34	..	1,503	4,452	2,441	33	212	14,607	5,291	10,450	38,989
1934-35	..	1,845	3,760	3,030	62	1,336	27,815	5,685	10,479	54,012
1935-36	..	1,471	5,278	3,863	119	487	25,878	5,820	10,636	53,552
1936-37	..	905	2,621	1,398	29	245	9,589	4,616	4,661	24,064
1937-38	..	1,061	4,620	1,394	49	309	12,381	2,666	5,299	27,779
1938-39	..	1,598	6,165	2,876	44	410	22,053	6,726	7,774	47,646
1939-40	..	2,453	7,045	2,352	42	256	18,737	5,167	7,842	‡43,895
1940-41	..	2,053	6,697	2,392	59	775	36,346	7,222	7,038	§62,590
1941-42	..	1,054	3,964	1,629	88	1,089	34,505	6,571	5,003	53,903
1942-43	..	658	3,031	1,003	110	607	23,410	5,419	4,555	38,793
1943-44	..	949	6,142	2,283	151	668	35,558	5,951	4,574	56,276
1944-45	..	1,124	6,816	2,348	95	718	28,409	4,223	3,554	47,287
1945-46	..	2,141	6,007	1,854	198	1,203	35,237	6,697	5,008	58,345
1946-47	..	3,418	11,035	3,199	446	1,404	42,236	5,600	4,495	71,833

* Chiefly Wellington Land District. † Includes 18 acres in Westland. ‡ Includes 1 acre in Westland. § Includes 8 acres in Westland.

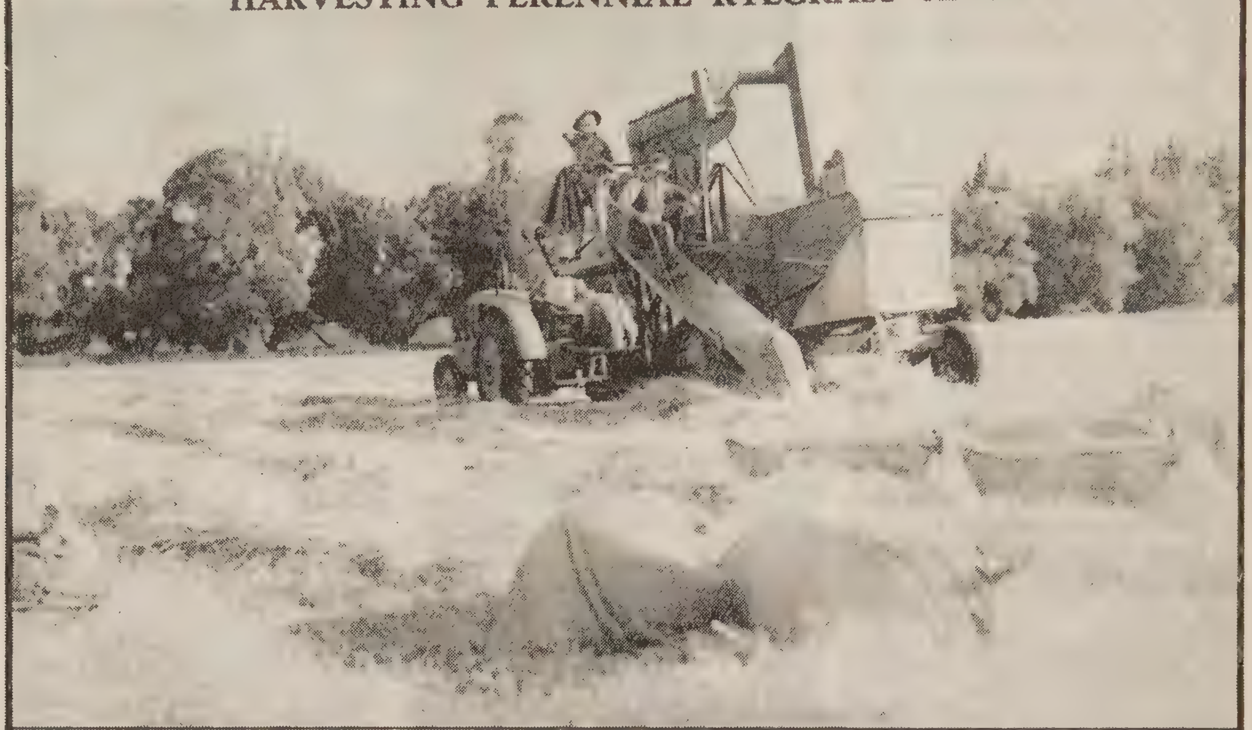
A practice commonly followed in Canterbury is to sow oats for green-feed after a cereal crop and to plough in the residue in October. When this method is used the land is rolled on the furrow to conserve soil moisture. Timely working with grubber, roller, and harrows develops the fine, firm, weed-free seed-bed essential to rapid establishment. Deep working during the final preparation of the land is not desirable, for it not only brings a fresh supply of weed seeds to the surface but also results in loss of soil moisture. Soil that is well worked retains moisture during a dry period, and if the ground is rolled about a week before the time of sowing, this moisture is brought very close to the surface.

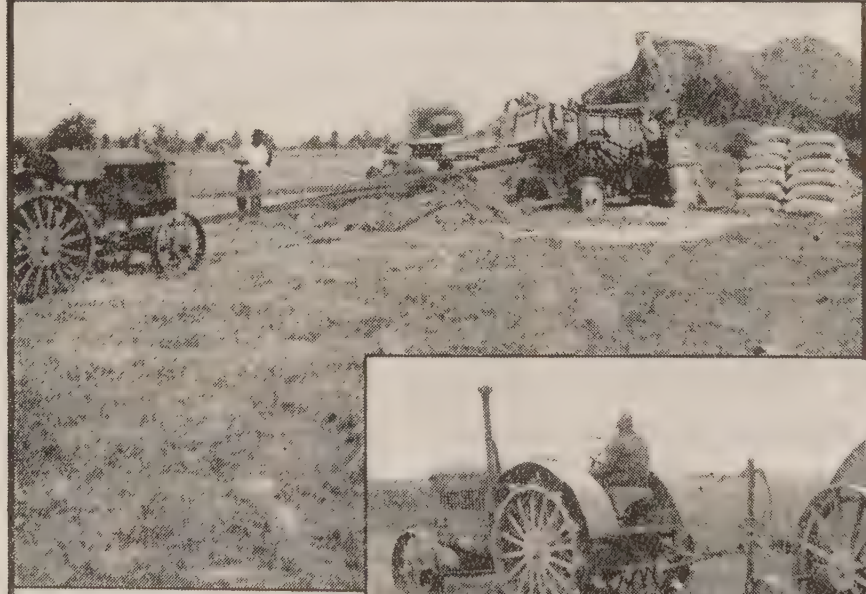
Methods of Sowing

The method of sowing the seed varies from farm to farm and from paddock to paddock. Under favourable conditions broadcasting gives a good spacing of plants and a quick ground cover, but in dry districts many of the seedlings are likely to die soon after germination. Drilling one way has the distinct disadvantage of slow ground coverage, but it is the safest method of sowing, particularly on the lighter soil types which dry out quickly. Where fertility is high perennial ryegrass and clovers usually grow quickly and soon fill in the spaces between the drills. A sowing method that finds favour principally on the better-class land is the drilling of the perennial ryegrass and the broadcasting of clovers.

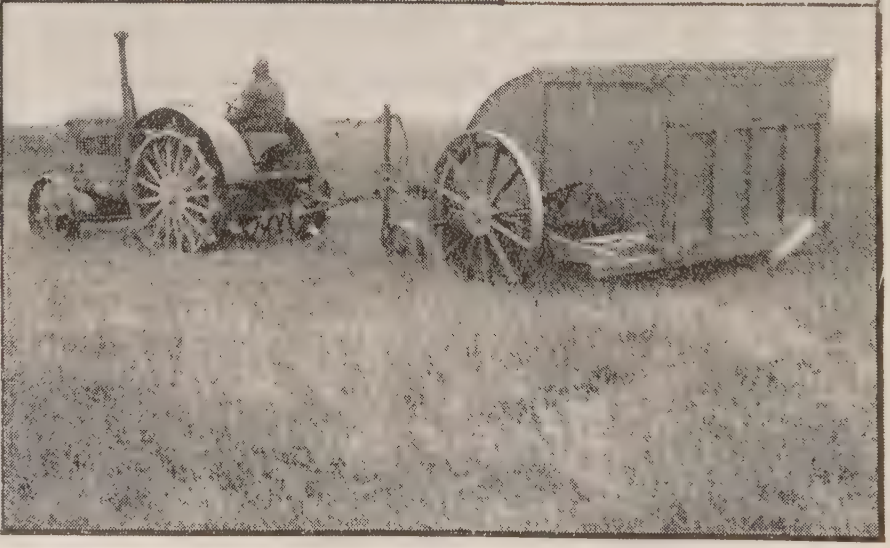
In many cases cross-drilling has proved highly satisfactory. If the work is carried out efficiently, not only is spacing good but the seed is placed at a uniform depth in moist soil. Fertiliser is concentrated in the drills with the seed and therefore facilitates rapid root development. However, with this method care must be taken to avoid an over-deep sowing, particularly in the first drilling. Drill coulters should be set right back, and where possible worn coulter tips should be used. Rolling between the two drillings is necessary for an even depth of seeding. Possibly the greatest danger in cross-drilling is a change of weather. If heavy rain follows the first drilling,

HARVESTING PERENNIAL RYEGRASS SEED





Though several methods of harvesting perennial ryegrass seed are still used, in recent years the header harvester (above) has come to be by far the most common means.



The stationary mill (above) is still largely used for crops that are cut with a reaper and binder. The stripper (right) is used to only a small extent and is useful chiefly for light crops.

the paddock may not be sufficiently dry to complete the sowing before the first seed sown has germinated.

There are points for and against each method of sowing, and farmers therefore must be guided in their choice by conditions ruling at the time of sowing.

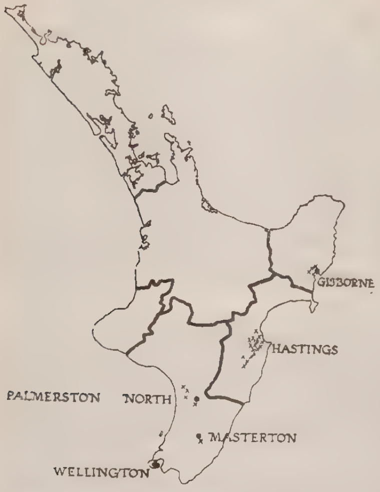
Lime and Fertiliser

No hard-and-fast rules can be laid down for the use of lime and fertiliser, and farmers must be guided by local knowledge. On most South Island farms 1 ton of carbonate of lime per acre should be applied to the land just before sowing. If lime is not available at that time, it should be topdressed on the area as soon as the plants have established. In some districts, particularly in the North Island, the use of lime is not warranted. In practically all cases phosphatic fertiliser should be sown with the seed.

Lime and phosphate promote healthy growth, and adequate topdressing with a suitable phosphatic fertiliser should be carried out each year, preferably during autumn or early winter. Lime deficiency of the soil should be corrected either by annual topdressing or by heavier applications every 3 or 4 years. The season for the application of lime is not as important as that for fertiliser, topdressing with which gives best results when carried out during autumn.

Where spring growth is slow a dressing of sulphate of ammonia at the rate of 1cwt. per acre may be applied at the time the paddock is closed for seed or 2 or 3 weeks later. That will promote grass growth and, in spite of the high price of this fertiliser, the increase in yield usually will more than compensate for the expense involved. If clover is threatening to smother the grass, a topdressing of 2cwt. of sulphate of ammonia per acre depresses clover growth, but this heavy application is not generally warranted.

Areas to be saved for perennial ryegrass seed should not be grazed heavily during winter and early spring. Lenient grazing of the perennial ryegrass-clover pasture tends to cause shading of the clover plant and thereby inhibit its growth. On the other hand hard winter grazing allows the clovers to make such rapid spring growth that the grass may be smothered.



The crosses indicate the districts of the North Island where perennial ryegrass is harvested for seed.

Though most ryegrass seed is now harvested with header harvesters, excellent yields are still secured by harvesting with a binder, stooking as in this illustration, and threshing with a stationary mill.

Time of Closing

The time for closing paddocks for seed production varies with conditions, and the following suggestions can therefore be only a guide.

On land where grass growth is backward because of low soil fertility or late sowing, stock should be removed toward the end of September. Under average conditions an area need not be closed from stock until mid-October, and if conditions are favourable for rapid growth, grazing may be carried on into November. On some farms the paddock is required for grazing until it is nearly fit to harvest; stock are then removed and a light seed crop harvested. In some districts sheep are run on the area until harvesting time to keep down such weeds as burr clover.

Harvesting

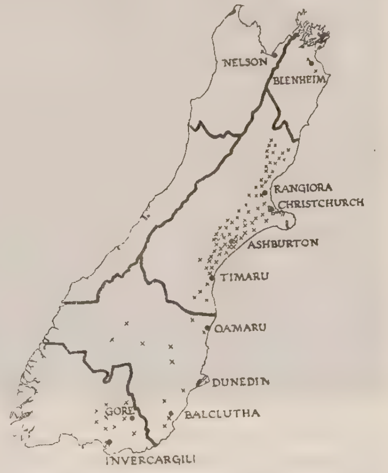
Hot, dry weather and an absence of strong winds give ideal ripening and harvesting conditions. Rain during the latter period of growth may result in tangled crops with abundant growth of clover and weeds.

Before the advent of the header harvester various harvesting methods were adopted: Some crops were mown and then threshed out of either cock or stack, light crops were handled by the grass seed stripper, and others were reaped and tied before being threshed out of stook or stack. The last method has much to commend it and is still used by some South Island farmers, but most perennial ryegrass crops are now windrowed and picked up with a header harvester. In the North Island this work is generally carried out by contractors, but in the South Island the farmer usually has his own header harvester.

Light crops may be either direct headed or handled with a grass seed stripper. In such cases the seed is allowed to become fully mature before harvesting is begun, and even then the crop is not in fit condition to be bagged in the usual way. Therefore it is placed in open-meshed sacks, which should be only half filled and then hung on a fence until the seed is thoroughly fit for bagging.

Perennial ryegrass is ready to windrow when it reaches the binder-ripe stage—that is, when the seed is well developed and has lost all trace of greenness. This stage is indicated when a few seeds have fallen and seed comes away readily into a hat swept lightly through the crop. Earlier cutting gives a pinched sample, and if the crop is allowed to become fully mature, loss from shedding is experienced.

In the North Island a mower fitted with an inside divider is usually used for windrowing, but in the South Island the binder is more commonly used for this purpose. If the crop is light, windrowing and picking up may be simplified by the use of 2 binders; one taking a 6ft. cut delivers the material from the platform canvas to the ground, and the second, from which the tying apparatus has been removed, takes a 10ft. cut, the material being run over the elevator canvas. Thus the 2 windrows are placed sufficiently close to enable both to be picked up at one round of the header. Though the header harvester gives best results when fed to reasonable capacity, heavy windrows with consequent overloading of the machine should be avoided.



The crosses indicate the areas of the South Island where perennial ryegrass is harvested for seed.

Upper—In the first year after being sown down perennial ryegrass dominates the sward. Middle—In the second and subsequent years clover becomes increasingly common and is often harvested in place of or in conjunction with the perennial ryegrass. Lower—A good 11-year-old sward harvested for seed occasionally. Under careful management high-producing, weed-free swards can be maintained if seed crops in consecutive seasons are avoided.

When the cut material is placed in an even, fairly-narrow, and not over-bulky row it conditions in a few days and threshes easily. Threshing should never be started before the crop is fit.

As perennial ryegrass is easy to thresh, the concave should be right open and the drum speed about half that used for wheat. Inaccurate setting and fast drum speed result in damaged seed.

The disposal of straw after the header harvesting of perennial ryegrass seed is too often neglected. It is of particular importance if the crop has been fairly bulky. Apart from its smothering effect, straw left lying on the paddock gives shelter to such pests as grass-grub, porina, and slugs, and many good pastures have been ruined by carelessness in this direction. This straw makes quite useful hay if baled directly after the header.

Machine Dressing

Modern seed-cleaning machinery is very efficient and, providing threshing has been carried out carefully, machine dressing presents no great difficulty. If seed has been harvested before it is fit, it will heat and suffer not only germination injury but also loss of appearance. Goosegrass is probably the most serious impurity in perennial ryegrass seed. If through hard threshing this seed is shelled, or the awns are removed from such species as goosegrass or Italian ryegrass, their separation from perennial ryegrass by machine dressing is not practicable.

Losses in machine dressing vary from line to line and may range from negligible quantities in the case of seed from very clean paddocks up to 50 per cent. or more in the case of seed from dirty, weed-infested areas. The average loss over all lines is about 35 per cent., including any white clover seed which may be separated and later recleaned.

Yields

Crops yielding 40 to 50 bushels of machine dressed seed per acre are by no means uncommon, though the average yield is about 18 bushels.

The possible number of remunerative seed crops depends very largely on management. In Hawke's Bay some pastures have been harvested periodically for up to 80 years and their yields are still high. On the mixed farms of Canterbury the general practice is to harvest perennial ryegrass seed in the first year, white clover in the second, and perennial ryegrass in the third and even fourth seasons. From that time it is usual to graze the area until it is again ploughed for supplementary feed or an annual cash crop.

An analysis of the yields in Canterbury for the 1946-47 season shows that areas harvested in the first season averaged 19.6 bushels per acre; areas which had been grazed right through the first season and harvested in the second season returned the same average yield, but areas which were harvested in both the first and second seasons averaged only 8.4 bushels in the second harvest. Many of these areas may have been treated primarily as white clover seed areas. All areas in their third harvest season averaged 13.2 bushels, these also probably including some handled primarily for white clover seed. As the age of the pastures increased so did the yields, those in their fourth harvest season averaging 14.8 bushels, in their fifth harvest season 16.8 bushels, and areas older than this (a very small proportion) 20.9 bushels per acre.

The bulk of the seed is harvested from young areas, the first crop giving the highest yield. The effect of successive crops is very marked and probably many areas in the second and third seasons are harvested chiefly for the white clover seed they produce.

From this stage onward yields have increased, and this may be accounted for by the harvesting of seed only from those areas where the perennial ryegrass has had every opportunity to become firmly established. Such areas can produce very satisfactory seed crops.

Subsequent Management

Because of the harvesting of successive seed crops without sufficient spelling, perennial ryegrass thins out in many pastures and an invasion of such species as goosegrass and hairgrass occurs. It may be found uneconomic to close such areas for seed, though with suitable management they may be brought back to a highly-profitable state.

Both goosegrass and hairgrass are annuals and may be eliminated or at least reduced to harmless proportions in the pasture. The aim should be to prevent their reseeding, and that may be accomplished by grazing and mowing. In summer the seed heads which will appear despite heavy grazing must be cut with a mower before they reach maturity. A spell under grazing permits the perennial ryegrass and clover plants to stool and cover the ground previously occupied by the weed species.

If this grazing and mowing are carried out before the weed infestation becomes too great, recovery to a high-producing state is rapid, but if it is delayed too long, ploughing the pasture will be the only satisfactory alternative.

Blind Seed Disease

Blind seed disease, which in damp seasons causes low germination in ryegrass seed as well as in such species as the fescues, crested dogstail, and darnel, has presented a serious problem not only to farmers and seed merchants, but also to research workers. The trouble is by no means new, but has been brought to notice since the cause was first discovered by Neill and Hyde in 1932. Since then the disease has been isolated in numerous countries.

As perennial ryegrass forms the basis of most New Zealand pastures, and is also the main seed exported, blind seed disease is of considerable economic importance to the country as well as to the seed producer, and unfortunately it is more prevalent in the better strains.

The blind seed fungus is carried over from year to year on infected seeds of either ryegrass or other susceptible species, the outward appearance of which may not differ from that of healthy ones. Infected seeds lie dormant in the ground during winter, but with a rise in temperature the fungus revives and small fungus cups (apothecia) develop. In an infected area an examination of the soil surface during November and December will disclose these minute, mushroom-like growths. The fungus cups produce spores which are ejected into the air and carried by wind during the flowering period of the ryegrass plant. Those that alight on open florets may, if suitable conditions of dampness exist, set up a fungus growth which penetrates the young seed and produces a fresh batch of spores enveloped in a slime which is soluble in water and is further spread by either dew or rain.

Development of the seed depends on the time that infection takes place. Early infection results in light seed, which usually is removed during machine dressing, but with a later infection the seed may appear quite normal and its removal be impossible.

Perennial ryegrass of poor type under ultra-violet light showing a high degree of fluorescence surrounding the roots.

These blind seeds which remain in the machine dressed sample or fall to the ground at or before harvest complete the life cycle.

The incidence of the disease varies from year to year, and its severity is increased by showery weather between flowering and time of harvest. Certain seed-producing districts usually provide seed of higher germination than that from others and germination of seed harvested from lodged crops is usually superior to that of seed from standing and open crops.

Since the disease was first recognised research work has been carried out in an endeavour to control it either by treatment of the existing strains or by the breeding of types resistant to it and still having the desirable characteristics of the present pedigree strain. Though some promising results have been obtained, this work is still only in the experimental stage and no definite recommendations can be made yet. However, there is considerable evidence to show that seed harvested from vigorous stands of perennial ryegrass or from crops which have lodged is of higher germination than that taken from weaker crops.

During recent years a pre-harvest testing service for ryegrass seed crops has been made available to farmers in the main seed-producing districts. This service enables the farmer to know the probable germination of his ryegrass crop before harvesting is begun. Where poor germination is indicated threshing costs may be saved and the crop used for hay,

Ergot

Ergot (*Claviceps purpurea*) in perennial ryegrass is important chiefly because of the seed losses it causes. The disease is easily recognised by the hard black sclerotia which take the place of seed in infected plants.

Infection occurs at the flowering stage, when the fungus spores are blown to the ryegrass flowers, where they germinate and exude a honey-like substance. This substance produces other spores, which are spread by insects to infect further flowers.

The ovaries of infected flowers become enlarged and the black sclerotia develop during the summer and either are harvested or fall to the ground. In this stage ergot overwinters before germinating in spring, when ascospores are liberated to cause reinfection of the new generation of flowers.

Measures to control this disease are the use of clean seed, destroying weed grasses which act as hosts, and not allowing affected plants to seed.

Rust

Though both stem and leaf rust are relatively common, they are not usually so severe as to reduce germination of the seed, but when infection is severe the yield is affected detrimentally because of the lighter weight of the seed.

Grass-grub

Grass-grub (*Odontria zealandica*) is responsible for the destruction of a large area of pasture. The brown beetle, the adult stage of the grub, lays its eggs chiefly in November and December, about a month later than does the porina moth.

The grass-grub feeds entirely on the roots of the plants, leaving the foliage untouched. As a result of the root damage the plants die off, and the soil is left spongy because of the activities of the grub under the surface. The damage is usually evident by early April, and the grub is recognisable by its whitish body, brown head, and horseshoe shape.

As yet there is no really satisfactory method of controlling the ravages of this pest. The use of a heavy roller, the concentration of stock during feeding out of hay, and the application of a suitable fertiliser assist in recovery of injured plants.

Porina

In contrast to the common grass-grub, the porina, or subterranean grass caterpillar, is a surface feeder affecting only the foliage or crowns of the plants. This pest, which is up to 2½in. long when fully grown, lives in single vertical burrows 6 to 9in. below the surface of the soil, emerging at night to feed on the surface. Its colour is usually a greyish green, and it has not the distinctive curving of the body which is characteristic of the grass-grub. The soil of an area infested with porina is not made spongy, but remains firm. Though grass-grub damage is most marked on light, friable soils, porina will cause trouble on quite heavy land.

Early recognition of the cause of damage is important. The presence of caterpillars may be recognised by soil casts on the surface distinguishable from worm castings by the fine web on porina castings.

The only reliable method of control is the use of poison bait. The materials used are bran and either paris green or arsenate of lead. The quantities per acre recommended for general use are 30lb. of bran, 1½lb. of paris green or 2½lb. of arsenate of lead, 3 gallons of water, and 1 pint of molasses. The mixture can be applied conveniently through a fertiliser distributor as soon as damage is noticed.

Areas closed for seed production are particularly subject to attack by either grass-grub or porina.

Army Worms

Attack by the caterpillar known as the army worm may ruin a perennial ryegrass seed crop. This pest derives its common name from its habit of moving in large numbers in definite directions. It often does substantial damage in one paddock while another close by is untouched.

The caterpillar feeds on foliage and seed heads of the plant, and a crop may be ruined almost overnight if infestation is severe. Once a crop is attacked by caterpillars little can be done to curtail the damage, and because of the sporadic nature of the attacks preventive measures are not warranted.

The much lighter attacks of today compared with those of earlier years can be attributed mainly to the spread of birds which feed on the pest.

Wheat Sheath Miner

Ryegrass is attacked by a fly (*Cerodonta denticornis*) commonly known as the wheat sheath miner because it also damages wheat. Injury to ryegrass is caused by the "maggot" or immature stage of the fly sucking the sap from the flowering stem, which results in a premature whitening and loss of the seed head.

The female flies of the wheat sheath miner, which are about 1/12in. long and greyish, emerge in early spring and within 3 days start laying their eggs in the blades of ryegrass. The fly punctures the blade and lays a single egg within the tissue. The egg-laying period lasts about 3 weeks, during which about 9 eggs per day are produced. The young maggot hatches in a week and immediately begins to mine in the leaf tissue. As the insect grows its tunnels can be seen with the naked eye as zig-zagging white lines. When the damage is extensive the sap supply is cut off and the leaf wilts, turns brown, and dies. The maggot may then enter the developing flower stem and cut off the sap supply to the seed head, causing the whitening and loss of seed.

The maggot reaches maturity in 9 to 24 days, according to the season. At this period it comes to rest between the sheath and the flowering stem, where it turns into the puparium or resting stage. This puparium, especially when it is present in wheat, is sometimes confused with the "flax seed" stage of the hessian fly, which it resembles superficially. At this time the white straws are observable in the field, so that puparium is the stage in the pest's life history which is usually noticed. The time spent as a puparium is usually 2 weeks or less during summer, but autumn broods overwinter in old straw and grass, and the flies emerge from the puparia in spring. Under suitable conditions the time taken from egg to adult is only a few weeks, and there are at least 3 generations in a season.

The wheat sheath miner is usually present in a ryegrass crop, but only periodically appears in sufficient numbers to be of any significance. A severe outbreak occurred in 1944 in North Canterbury where in some severely-damaged areas there were as many as 7 and 8 white straws per sq. ft., whereas other paddocks showed very few damaged straws. However, during the past 3 seasons no significant outbreaks have been reported.

This insect has been introduced into New Zealand and is now found throughout the country. For many years it has appeared periodically in isolated areas, but so far it has not been regarded as a serious pest of perennial ryegrass.

EXPORTS OF PERENNIAL RYEGRASS SEED (tons)

Destination	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947
Certified											
United Kingdom ..	38	5	18	22	46	362	961	2,574	639	627	809
Australia	250	132	201	37	411	74	141	349	649	826	378
Canada	17	3	2		4	4		1	30	4	59
U.S.A.	16	20		4	122	16	20	24			
South Africa ..	9	1						1		9	1
Eire									7	5	27
France									25		
Netherlands ..										65	116
Belgium											239
Other countries ..	5	1		½						2½	5
Uncertified											
United Kingdom ..	304	24	1		243	105			482	697	19
Australia	428	179	165	19	169	39	155	279	256	573	51
Canada	8	14	5	13	57	33	32	89	72	12	¼
U.S.A.	72			4	27	144	20	18			
South Africa ..	11	19	12			4			3	2	3
Netherlands ..										15	100
Belgium										128	431
France									64		77
Other countries ..	1	3	2	½							
Total exports ..	1,159	401	406	100	1,079	781	1,329	3,335	2,227	2,965½	2,315¼

Seed Markets

About half a million acres of land is sown to pasture each year in New Zealand, and if a conservative figure of a bushel of perennial ryegrass seed to the acre is taken as the rate of seeding over the whole area, local consumption of seed is about 5000 tons a year. That figure is probably fairly constant, in contrast with the fluctuating quantities exported from year to year, details of which are shown in the table on this page.

The United Kingdom and Australia provide the chief markets, though in the past 2 years very appreciable quantities have also gone to the Continent of Europe.

Extreme fluctuation in the quantities of uncertified seed sent to the United Kingdom has been caused by the introduction of import embargoes in that country when supplies of seed of superior quality have met requirements.

The following table gives prices to growers of perennial ryegrass seed during the past 20 years:—

	Uncertified seed	Certified Permanent Pasture seed
1928 ..	4s. 9d.	9s. to 10s.
1933 ..	3s. 6d.	8s.
1938 ..	5s. 6d.	10s.
1943 ..	6s.	12s. 6d.
1948 ..	10s. 6d.	15s. 6d.

Because of the overseas demand peak prices were obtained in the 1946 season, when growers were paid 26s 6d. per bushel for Certified Permanent Pasture seed and more than £2 per bushel for Certified Pedigree seed.

Importance of High Yields

On most farms the saving of perennial ryegrass seed is secondary to the growing of pasture for stock feeding. However, the fact that more than 25,000 acres must be harvested each year to meet local requirements alone indicates that the practice is important in suitable districts.

High prices for seed have encouraged seed harvesting in some districts and under types of management not really suitable for the purpose. Though reasonable returns may have been received under these conditions, the importance of producing high yields of good-quality seed must not be overlooked. By the application of those practices which will lead to high yields of seed and consequent lower unit costs, the grower is at the same time encouraging higher consumption locally and making easier the finding of an overseas outlet for surplus supplies.

THE HOME GARDEN IN DECEMBER

By A. G. KENNELLY, Instructor in Vegetable Culture, Department of Agriculture, Christchurch.

DECEMBER is a busy month in most home gardens. Successional sowings of french and dwarf beans, carrots, beet, lettuce, radish, spring onions, and turnips should be made as required. Trenches or beds should be prepared and celery plants set out. The supply of autumn and winter vegetables should not be overlooked; cabbage, brussels sprouts, leeks, cauliflower or broccoli (winter cauliflower), and the finer sorts of kale should be set out in December or January in well-manured soil that contains adequate moisture. Silver beet and lettuce can be thinned, or if soil conditions are not too dry, plants can be set out.

[*Sparrow Industrial Pictures Ltd. photo.*

Dwarf and runner beans require to be picked regularly or production will decline. Pods should be picked before they reach full maturity.

SWEDES, turnips, and peas can also be sown if a supply of moisture can be assured. Parsnips can still be sown, though it is rather late for this in southern districts. Weeding and hoeing are still very necessary even among well-established crops. Weeds not only deprive crop plants of food and moisture, but they are often the means by which insect pests and diseases are carried over from season to season. Hoeing assists aeration and the conservation of soil moisture. Liquid manure can be applied to most crops with advantage and where necessary watering or irrigation should be attended to. The supply of water is particularly important to the growth and setting of beans, to the growth of lettuce and celery, and to only a slightly less extent to that of other greens. Tall crops such as runner beans should be staked and most varieties of tomatoes will require pruning, staking, and tying and, except in some southern districts, spraying with arsenate of lead against caterpillars and with Bordeaux or suitable Government certified substitute against fungus disease. The pulling of main crop rhubarb should be discontinued.

Celery should be sprayed with Bordeaux or suitable substitute even before leaf spot appears and in humid climates potatoes should also be sprayed. Potato tubers should be kept well covered and the soil moulded to as sharp a ridge as possible.

Asparagus

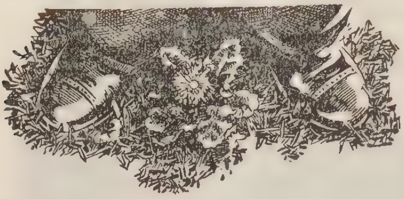
The cutting of asparagus shoots should not be continued too long or future production may be impaired. Cutting usually ceases about the end of November or middle of December according to district and the beds should then be cleared of weeds and cultivated. A complete fertiliser scattered over and worked into the bed at the rate of 1½oz. per square yard will stimulate development of the strong, healthy fern growth by which the roots are enabled to store up food for next season's growth. Strong fern growth also assists the suppression of weeds, so that the beds should require little further attention during summer.

Dwarf and Climbing Beans

Though runner beans usually continue to yield pods throughout the season if cultural conditions are satisfactory and the pods are kept picked, dwarf, butter, snap-pod, or french beans should be sown successionally. Two sowings are usually enough; one to come up just after the date of the last killing frost and another sowing in December or January. Grown under favourable conditions, dwarf beans come into bearing in about 7 to 9 weeks. The situation should be warm and sheltered; for late sowings a warm situation is essential, particularly if there is a likelihood of a cool autumn. The soil should be well drained and of even moisture content. Dryness at the roots is a frequent cause of disappointment with the bean crop. Though no special soil is required, a well-drained loam reasonably supplied with organic matter is preferable. On poorly-drained soils the plants become yellow, because of the death of some of the roots, and are therefore considerably weakened, particularly if the weather is wet. The soil should be well worked before sowing. Beans are not gross feeders and on most soils superphosphate is the only additional fertiliser needed, though moderate dressings of well-rotted organic material such as farmyard or stable manure or compost are advisable where the soil lacks "body;" that is, where the soil has a poor capacity for holding moisture or where it cracks and cakes badly and is difficult to work to a fine, open tilth. Watering or irrigation is frequently necessary during December. For dwarf beans seed should be sown 1 to 2in. deep and 3 to 4in. apart in rows 24in. apart. Popular varieties are Woods Centenary, Black Valentine, Pale Dun, Burnley Selection of Canadian Wonder, and The Prince.

Broad Beans

Broad beans grown to mature in November or December are doubly welcome in most home gardens, as the variety of vegetables ready for harvesting at that time is very limited. Broad beans are a good source of vitamins and are rich in iron. Though some varieties are quite tall, the preferred practice is to stop beans when 3 to 3½ft. high, as staking or supporting them is difficult otherwise unless suitable facilities and shelter are available. If the growing tips are pinched out, the plants are less likely to be troubled by black aphides, which usually appear in spring and attack the soft growth at the top of the plant. Stopping the plant often slows the aphides' rate of increase to such an extent that they are controlled by their natural enemies, lady-birds and their larvae, lace-wing flies, and other predacious insects. Control is important even where the crop is practically



How much of each square foot of your pasture REALLY PRODUCES?

On an average pasture, only about four-fifths. The other fifth is weeds. Prove it yourself. Just stand with your feet at right angles to make two sides of a square and count the weeds in that area. Note the large amount of grass crowded out by the weeds, particularly the flat weeds.

These weeds reduce production, reduce carrying capacity, lower fertility and depreciate land values. They cost you real money. You can save that money by spraying most troublesome weeds out of your pasture with WEEDONE CONCENTRATE '57'. A selective hormone weedkiller, it will kill the weeds right down to the root tips, but will not kill the surrounding grasses and clovers. Then, by oversowing or merely allowing the grasses and clovers to re-cover the gaps, you will have weed-free, productive pastures.

Using an agricultural contractor, WEEDONE CONCENTRATE '57' can be applied at a cost of under 35/- per acre, including cost of material and application. Consult your nearest Distributor listed below.

Spray the Weeds out of your Pasture with

WEEDONE CONCENTRATE '57'

Manufactured by

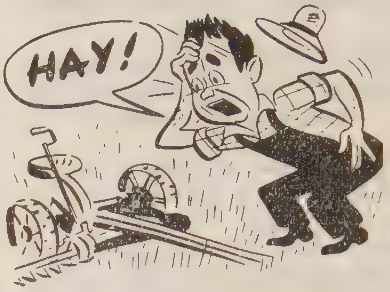
IVON WATKINS LTD.
32-34 Currie Street,
New Plymouth.

DISTRICT DISTRIBUTORS:

AUCKLAND, F. M. Winstone (Seeds) Ltd.; MANAWATU-RANGITIKEI, Abraham Seed & Produce Co. Ltd.; WELLINGTON & NELSON, N.Z. Loan & Mercantile Agency Co., Ltd.; GISBORNE, Common Shelton & Co., Ltd.; HAWKE'S BAY, H.B. Farmers' Co-op., Hastings; TARANAKI, Farmers' Co-op., Hawera; WAIRARAPA, W.F.C.A. Ltd., Masterton; CANTERBURY & WEST COAST, Alex McDonald & Co., Christchurch; MARLBOROUGH, Wright Stephenson & Co. Ltd., Blenheim; OTAGO, Bruce Christie & Co., Oamaru; SOUTHLAND, S.I. Dairy Assn., Invercargill.

Mr. FARMER

You'll not cut your Hay unless your Cutter Bar is in good order.



★

WE NOW OFFER YOU OUR FACTORY BACKED

CUTTER BAR REPAIR SERVICE

FOR ALL McCORMICK-DEERING TRACTOR AND HORSE MOWERS

We've got the GENUINE IN PARTS and the trained men to see that your Mower is ready to cut Hay when YOU are ready.

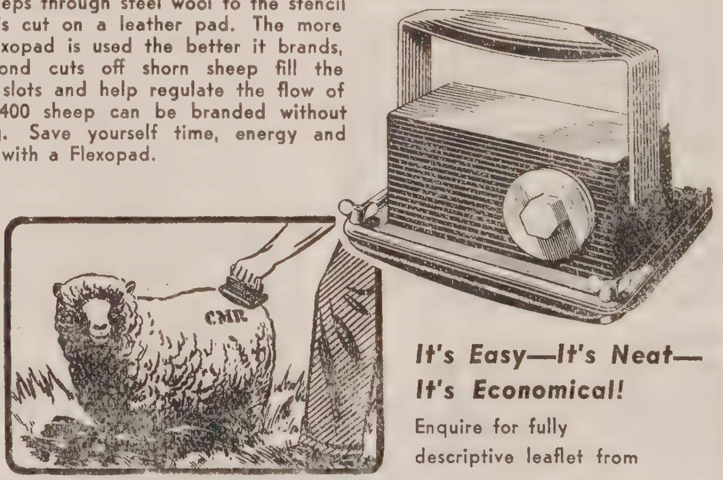
RAIL YOUR BAR *NOW* TO YOUR NEAREST BRANCH

INTERNATIONAL HARVESTER CO. OF N.Z. LIMITED
Auckland Palmerston North Wellington
Christchurch (Head Office) and Dunedin

NEW Automatic Sheep Brand!

FLEXOPAD

Excellent features of this appliance have made it immediately popular with N.Z. sheepowners. No unwieldy pot and iron—no slopping and wasting of fluid, in fact no mess. Just a simple filling of the Flexopad reservoir and the fluid seeps through steel wool to the stencil which is cut on a leather pad. The more the Flexopad is used the better it brands, as second cuts off shorn sheep fill the stencil slots and help regulate the flow of fluid. 400 sheep can be branded without refilling. Save yourself time, energy and money with a Flexopad.



Also for marking wool bales, cases, etc.

It's Easy—It's Neat—It's Economical!

Enquire for fully descriptive leaflet from your Stock and Station Agent, Merchant or the N.Z. Distributors

COOPER, McDOUGALL & ROBERTSON (N.Z.) LTD.
BOX 599 AUCKLAND

finished, because if not checked, the black aphides quickly spread to dwarf and runner beans, chrysanthemums, and a host of other subjects. Aphides are easily controlled when on only one crop by spraying with nicotine sulphate, at the rate of 5 teaspoons to 4 gallons of water (plus 2oz. of soft soap to serve as an activator). A hot, still day should be chosen for spraying, as nicotine sulphate is then more effective.

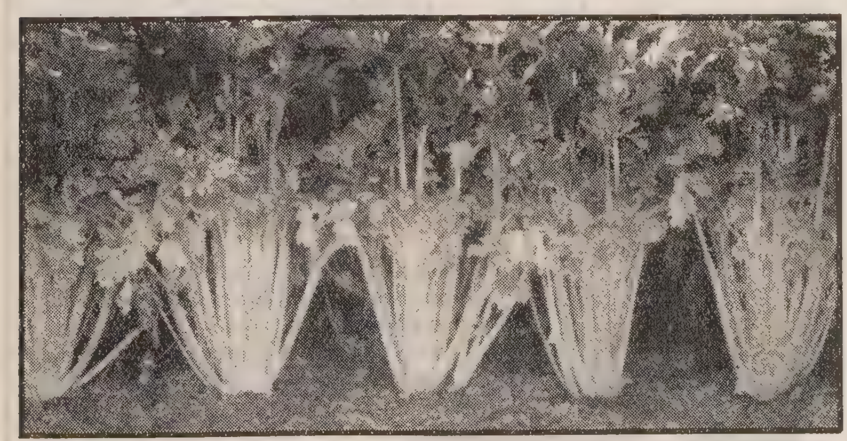
[*Green and Hahn Ltd. photo.*

Asparagus beds should be given an adequate period of rest each year or further production may be impaired. Cutting should cease by the end of November or mid-December and the bed can then be mulched.

Carrots

Small successional sowings of carrots can be continued or the main crop can be put in now. Carrots are a useful vegetable for winter, and where there is sufficient moisture in the ground December is a good time to sow. Dry conditions check growth, and affected young plants quickly succumb if aphides attack them. December or January sowings of intermediate or stump-rooted kinds usually result in the production of good-quality roots in late autumn, whereas roots from earlier sowings have by that time usually developed to a large size and are consequently rather coarse. A close watch should be kept for aphis attack. The carrot aphides are small, globular, and green or yellowish-green and may be wingless or have four transparent wings. They suck the sap and stunt growth, so that young plants may wilt in hot weather. The tiny, white specks present are the cast skins of the aphides. The foliage may change to a bronze, bluish, or reddish hue and the leaves and petioles become distorted. Aphides are also a serious pest because they spread virus disease, which may cause a twisting of the leaves and petioles and a yellowing and finally reddening with perhaps a stunting and rosetting of growth. Affected leaves may be brittle, and dead brown areas appear. The only control for virus is to rogue the crop when the disease is first noticed and to keep down aphides by spraying with nicotine sulphate at the same rate as is used for black aphides.

Where the carrot rust fly is troublesome a repellant, usually naphthalene, is necessary. Naphthalene should be broadcast over foliage and 6in. on either side of the rows at the rate of 4oz. to 20ft. of row at intervals of 10 to 14 days. It should be applied regularly, as it is volatile, but its application should be stopped about 14 days before harvesting or there may be some residual flavour of naphthalene after cooking. The adult fly is about 1/3in. long with reddish eyes and a yellowish head. It has yellow legs and one pair of wings and lays its eggs near the crown of the carrot; the larvae or maggots after hatching burrow down and attack near the tip of the taproot. Young plants may wilt or die. The maggots are slender, creamy white, rather rigid, legless, and up to ¼in. long; they are broad at one end and taper off to a slender head. They burrow into the tissue of the taproot and leave rusty-brown tunnels, which at first are only near the surface of the carrot.



[*Green and Hahn Ltd. photo.*

A bed of self-blanching celery from which the board has been removed to show the blanching stems. Seedlings set out now will mature very quickly if planted in a rich, moist, well-drained soil.

Celery

December and January are the preferred months for setting out celery. Most seedsmen sell boxes or smaller lots of the popular self-blanching varieties such as Golden Plume and Golden Self-blanching. The older varieties such as Solid White are not much in demand now, as they require more work to blanch successfully. Red and green varieties, which were once popular for very late cutting for stews and soups, are not generally now listed by seedsmen. For most home gardeners the purchase of plants from seedsmen is preferable to raising them from seed, as few gardeners except perhaps those in the warmer, more sheltered districts can sow and raise the plants successfully without a frame or small greenhouse. The seedlings should be thoroughly watered before they are set out in prepared beds or trenches. Trenches are preferable where conditions are dry, as beds are usually more difficult to water. The plants can be set in double rows, though where celery is a popular article of diet it is often planted in beds containing 4 or even 6 rows. Plants can be set 8 to 10in. apart each way. If trenches are dug, they should preferably be shallow except where it is intended to earth the plants up the stems, but the soil in the trenches should be enriched with well-rotted farmyard or stable manure or compost. Celery succeeds best in a very rich soil and the bulk of the fertiliser should preferably be organic (farmyard, poultry manure, etc.). Plants should never be permitted to become dry at the roots, but alternate flooding and

SHEARING

Bulletin 246, "Shearing," is a sound textbook on the art of shearing which contains many illustrations of the correct stances and techniques. Price 6d.

KILLING YOUR OWN MEAT

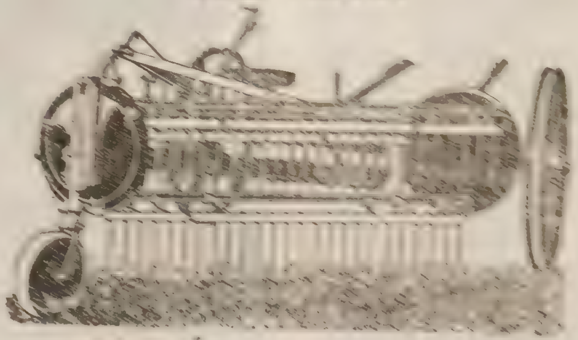
Bulletin 249, "Killing Your Own Meat," deals with the finer points of butchering as well as the most hygienic and efficient methods of killing on the farm. Price 6d.

These bulletins are available from any office of the Department of Agriculture.

Does the work of a Team of Men!

BOOTHMAC *NICHOLSON*

COMBINED SIDE RAKE, SWATH TURNER AND TEDDER



Order Now! Supplies Available!

BOOTH MACDONALD & CO. LTD.

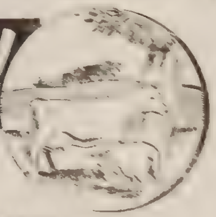
BRANCHES THROUGHOUT NEW ZEALAND
Head Office: P.O. Box 98, Christchurch

S-P-R-E-A-D IN
TOMOANA
Haystack
MIXTURE
AND
E-N-R-I-C-H YOUR
Hay

J.6

CONSULT YOUR PRODUCE MERCHANT

FARM for PROFIT!



LEARN THE BUSINESS SIDE OF FARMING . . .

What to watch in buying a farm . . . how to finance and start on your own . . . how to keep simple books that give you a [illegible] record of your profit and loss . . . useful tips on the law that every farm manager should know . . . these are only some of the essential details taught by the Druleigh Book-keeping and Management Course. It teaches you to take out your own Balance Sheet and Income Tax Returns . . . to become an efficient farmer. Druleigh's special Diploma Course of Home Study training on Farm Management, Farming Law, and Farm Book-keeping is specially written by experts. A wonderful investment for any young man who wants to make farming pay.

BE A SUCCESSFUL FARMER!

DRULEIGH *College of*

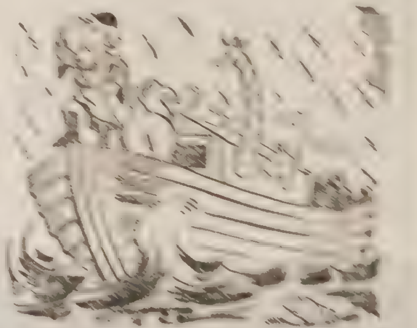
FARM BOOK-KEEPING
VULCAN LANE, AUCKLAND.

Dear Sirs,—Please send me, without obligation, full details of your simplified Farm Book-keeping and Management Course.

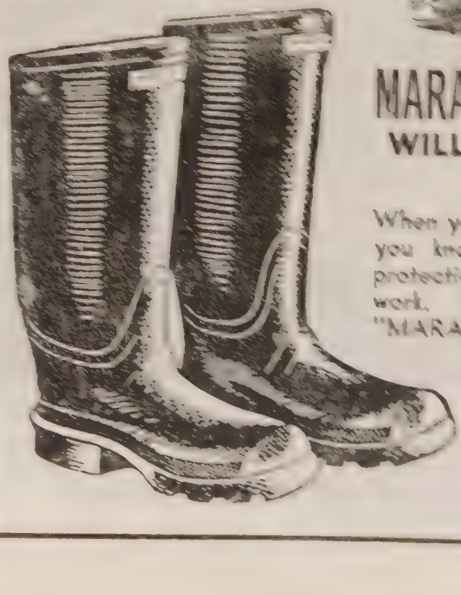
NAME ....

ADDRESS .... J.A.

When Noah sailed the seven seas
He didn't give two hoots—
The firm's name of "Marathon"
Was branded on his boots.
For forty days and forty nights
He braved the wind and rain—
He said that with his "Marathons"
He'd do the same again.



Whatever the Weather
Whatever the Work . .



MARATHON GUMBOOTS

WILL KEEP YOU WARM AND DRY!

When you wear Marathon Gumboots you know that they will give real protection and stand up to hard work. You can't buy better than "MARATHON."

Made by
MARATHON RUBBER
FOOTWEAR LTD.,
WOOLSTON, CHRISTCHURCH,
NEW ZEALAND.

THE HOME GARDEN IN DECEMBER

[*Photo News Ltd. photo.*

Leeks establish themselves quickly and require little attention. A start can be made now with the planting of the first part of the crop.

any tendency to dryness should be avoided. The soil should be kept moist, and as good drainage is essential, it is often advisable to trench deeply before forming the bed. Raised beds are preferred when drainage is poor and watering does not present difficulty. The simplest method of blanching the newer types of celery is by the use of boards, usually about 10 or 12in. by 1in., placed on their edges around the sides of the bed.

Leeks

Though leeks can be set out earlier and, in districts where the autumn is sufficiently long, later, December and January are the preferred months. It is a good plan to have two or more plantings. An early, a mid-season, and a late planting will in most districts ensure a supply of leeks from autumn until late spring. Leeks are a great standby and are very easily grown. They are rarely affected by insect pests or disease, and though cabbage and cauliflower (or broccoli) mature according to their season and are available or in best condition only then, leeks will stand for many months and may be used as required. They are a good source of vitamins B and C.

Plants can be set out 6 to 8in. apart in rows 12in. apart. A trench 3 to 4in. deep can be drawn out with a hoe and holes made with a dibble somewhat deeper than the white portion of the plants to be set out so that the plants can be dropped in the holes and left with portion of the green tops (the ends of which should be cut off) protruding. If the plants are then watered, it will not be necessary to fill the holes. as the soil will gradually erode and fill them. Where the soil is heavy and sticky the holes should be made with a trowel, as a dibble will consolidate it excessively. Soil for leeks should be rich, preferably in organic manure, but where the water-table is sufficiently high excellent crops can be grown with artificial fertilisers alone. A complete fertiliser (one containing nitrogen, phosphoric acid, and potash) should be applied and thoroughly incorporated throughout the bed at the rate of 3 or 4oz. per square yard.

Varieties: London or Broad Flag, which is best grown for early use; Musselburgh, which is a very hardy variety characterised by its long. thick stem; Lyon, generaly similar to the London, but which grows larger and is slower maturing. Lyon is a good variety for a late crop, as it is slow in running to seed.

Parsnips

Though it is rather late for parsnips to be sown in most southern districts, they can still be sown where. as in northern districts, the autumn is sufficiently long to enable the plant to develop fully before winter stops growth. In southern districts the quick-maturing Oxheart varieties can be expected to succeed from a December sowing and in general this type of parsnip is very useful. It is of special value in shallow soils or where the subsoil forms a hard pan which is difficult to dig and keep open.

Varieties: Student. Hollow Crown, and Oxheart or Stump-Rooted.

Potatoes

In northern districts where potato blight is often troublesome plants should be sprayed regularly with Bordeaux or a suitable Government certified substitute as growth develops. A coverage should be maintained over the newly-developed leaves, as the disease develops quickly and spraying is usually too late to be effective once the plant is attacked. Growing crops should be kept moulded to a ridge as fine pointed as possible, and the tubers should be well covered with soil. Potatoes can still be planted where the soil is likely to retain sufficient moisture for growth. An early or preferably a second-early variety should be chosen and the tubers set 10 to 14in. apart in a trench 4 to 5in. deep. The soil should contain a moderate supply of well rotted organic material; that applied to a previous crop is preferable. Additional plant food can be supplied before planting by dusting a mixture of 3 parts of superphosphate and 1 part of sulphate of ammonia in the trench at the rate of 6 to 12oz to every 6yds. of row. Successional planting is practised by many home gardeners to ensure a continuous supply of new potatoes.

Varieties: Second early or early main crop: Arran Banner, Aucklander Short Top, King Edward VII, and Early Rose. First Early: Epicure and Doon Early.

Radish

Small successional sowings of radish should be made as required. Cultural requirements for radish are similar to those of carrots and beet, but as the crop matures much more quickly, it is more sensitive to adverse conditions. The soil should be well drained and the top 6in. cultivated to a very fine tilth. It should be very rich in fine, well-rotted organic matter; compost is excellent. The seed should be sown thinly (12 to 15 to a foot) ¼in. deep in rows which need be only 4 to 6in. apart. The soil should be gently firmed after sowing, as the roots do not "bulb" well in loose soil. Seed can also be sown broadcast, but weeding is more difficult. The roots should never dry out and in midsummer shelter from the sun is advisable; this is best achieved by sowing in the shade of a taller crop. The vitamin and nutritive value of radishes is not high; their value lies in their fresh crispness and mild pungency, which is, however, so greatly increased by slow growth or checks that in adverse conditions they are likely to be hot, pithy, and indigestible. Seed can be sown any time of the year in well-drained soil, provided there is sufficient moisture and ground temperature is not below about 52 degrees F. Raised beds are best in most gardens in winter.

Varieties: Oval shaped: French Breakfast, Red Rocket, and White Wonder. **Turnip shaped:** Early White or Early Red Sparkler, Giant Crimson Butter, and Round Black Spanish. **Long:** White Icicle, Long Scarlet, Chartiers (Cardinal), and Long Black Spanish. **Giant or Chinese:** Chinese Winter, White or Celestial, and China Rose. In general the round sorts withstand hot, summer conditions best and the giant varieties are best suited to autumn sowing for winter use, as they stand well.

Swedes

Where the soil is not too dry swedes can now be sown. November sowing is preferred in some southern districts. Swedes succeed best under cool, moist conditions with neither dry nor very wet periods. They should be kept growing without check, as otherwise they tend to be woody and tasteless. They are usually preferred as a winter vegetable. and if sown late. they keep well under cool conditions. Seed should be sown ¼ to ½in. deep in rows 12 to 15in. apart and the plants later thinned to 6 to 8in. apart in the rows.

Varieties: Laings Garden (medium) and Superlative.

THE HOME GARDEN IN DECEMBER . . .

Tomatoes

Few crops are subject to as many diseases as the tomato, and plants set out earlier should be watched for symptoms of disease. Plants that show any deviation from the normal should be rogued at once. Distortion of the young leaves or mosaic mottling may indicate infection with virus disease, different types and combinations of types of which vary in their effect on the plant. Plants which develop narrow, often distorted fern-like leaves or have a stunted appearance usually produce little if any crop and should be removed and burnt. Those infected with spotted wilt, shown in the early stages by a bronzing (often very fine) of the foliage with a pattern of brown spots toward the base of the top leaflets and usually later by a stunted appearance and a rolling and bunching of the top leaves, should be burnt. Spotted wilt is one of the most serious diseases with which the tomato grower has to contend. It is commonly spread from diseased to healthy plants by thrips (minute, dark, cigar-shaped insects about 1/16in. long with fine, hair-like or brush-like wings; the larvae are usually yellowish-green). Many garden plants such as Iceland poppy, chrysanthemum, lettuce, nasturtium, aster, dahlia, and zinnia are subject to attack and also serve to carry over the disease from season to season. Thrips are difficult to control, as they have such a wide range of host plants and in the warm sheltered conditions which suit the tomatoes they are prolific breeders. Frequent spraying with nicotine sulphate at the rate of 7 teaspoons to 4 gallons of water, plus 2oz. of soap (previously dissolved in hot water) seems to be the most generally effective method in the open, though tartar emetic and fumigation are the methods usually adopted under glass.

In districts where potato blight, stem-borer caterpillar, and looper caterpillar are troublesome regular spraying is essential. Bordeaux (or suitable Government certified substitutes) plus 2oz. of lead arsenate powder should be applied. The first spray should be applied about 7 to 10 days after planting out and thereafter spraying should be repeated every 2 to 4 weeks according to the weather and the extent to which the disease is troublesome. Early December is not too late to set out healthy, well-grown plants, and because the soil has warmed, excellent results are often obtained from a December planting. The plants usually commence to grow at once and rarely suffer the root rots which so commonly affect early plantings. Established plants (except dwarf varieties) should be pruned regularly by the removal of side shoots, which grow from the main stem at each branch. Tying should also be attended to. Methods of supporting the plants were described in the September issue of the "Journal."

Other Vegetables

Salad vegetables such as lettuce, spring onions, turnips, mustard, and cress should be sown successionally, as they remain in the best condition for only a short time and it is advisable to arrange sowing so that a new crop is approaching maturity as the old passes its best condition. Quick growth is essential for quality in all salad vegetables and the soil should be rich in organic matter, moist, and cultivated to a fine, deep tilth. Lettuces are usually thinned when soil conditions are dry, but if they are planted out, they should first be well watered and then lifted with a good ball of soil and roots and watered immediately they are in their new positions. If conditions are very hot, a third can be cut from the older leaves to reduce transpiration or the plants can be covered with newspaper or slabs of wood for a few days until they are established. Peas can still be sown if the soil is sufficiently cool and moist and is likely to remain in that condition. A dwarf or intermediate variety is preferable in most districts for December sowing. The pulling of stalks of main crop rhubarb should cease now and the plants be permitted to rest and recuperate; a good mulch of compost will benefit the crowns.

Winter Greens

The provision of winter greens is a test of gardening ability. The range of vegetables which mature in summer and autumn is such that it is not difficult then to keep up a supply, but during the winter the scope is more limited, and though root crops provide a good standby, it is the provision of a regular supply of green vegetables (which are so rich in the vitamins especially needed during the winter months) that is the mark of the good gardener. December and January are the preferred months for setting out the principal winter green crops; that is, cabbage, broccoli (winter cauliflower) and in mild districts ordinary cauliflower, brussels sprouts, various kinds of kale or curly greens, and leeks. Plants may be obtained from seedsmen and should be set out in a rich, deeply-cultivated, well-drained soil. The incorporation of organic material such as well-rotted stable or farmyard manure, old stack bottom or compost or the digging in of a heavy green crop is desirable on most home garden soils. In addition, a complete fertiliser (one containing nitrogen, phosphoric acid, and potash) should be applied at the rate of 3 to 4oz. per square yard. It should be thoroughly incorporated, because though all the above subjects require a soil rich in plant food, most of them are easily over-manured when young and placement of the manure should be such that the roots are not damaged through contact with considerable quantities of manure; they should be able to absorb plant food as they require it in an ever-widening area as they develop. Moisture in ample quantity is essential to the growth of winter greens and the soil should not be permitted to dry out.

The list of varieties suitable for planting out is very great. The following are suggestions (the maturing times for plantings of broccoli and savoy made now are given in parentheses):

Broccoli: Early White (March to May), Mammoth Winter White (June and July), Lily White No. 2 (August and September), and Late Queen (September and October).

Savoy cabbage: Omskirk Early (March and May), Drumhead (May and July), and Omega (July and September).

Kale: Dwarf Green and Tall Green Curled.

Brussels Sprouts: Scrymgers Giant and Long Island Improved.

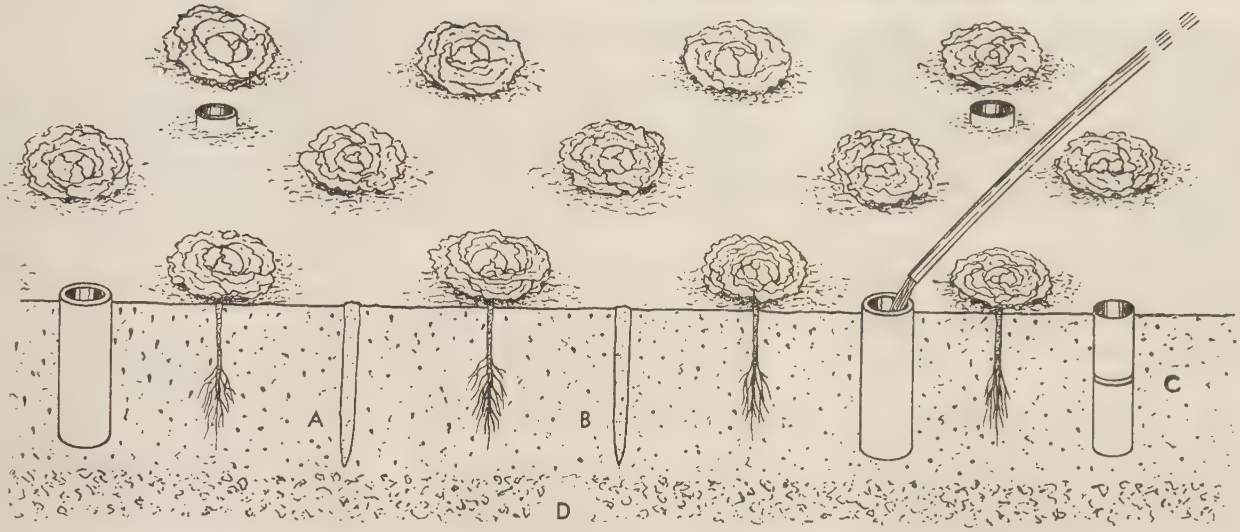
Watering

At this time of the year crops frequently suffer from drought, and

METEOROLOGICAL RECORDS FOR OCTOBER

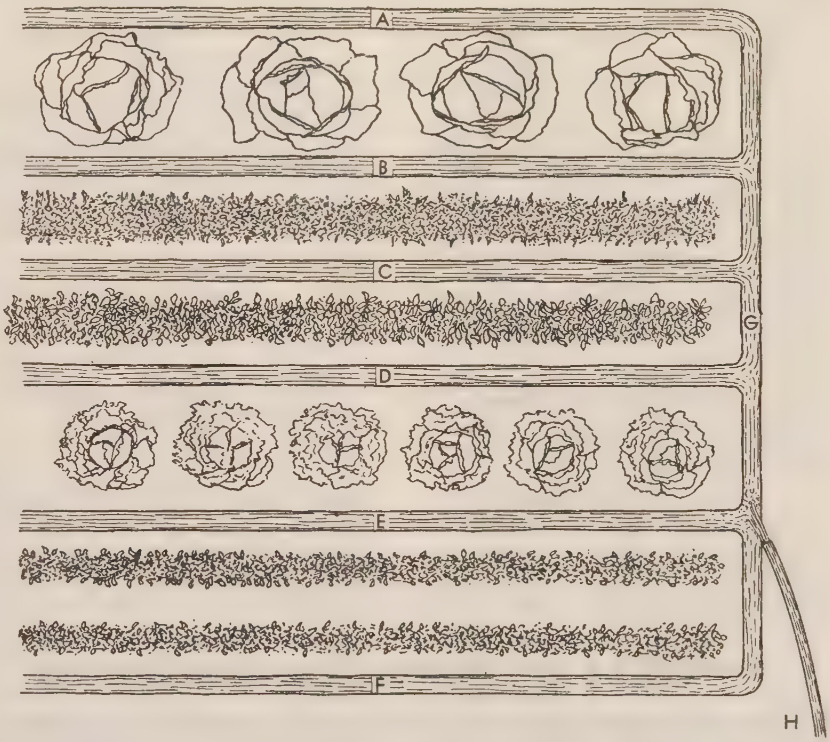
Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit): Approx. mean	Difference from normal	Absolute maximum and minimum: Maximum	Minimum	Rainfall in inches: Total fall	No. of days of rain	Difference from normal	Maximum fall: Amount	Date	Bright sunshine hours
Waipapakauri ..	6	59.8	+ 3.4	71.4	38.4	4.98	18	+ 1.22	2.04	22	
Tauranga	10	55.8	— 0.1	74.0	40.5	6.15	19	+ 1.21	1.24	23	197.1
Ruakura	131	53.9	— 0.9	75.6	34.5	8.20	28	+ 4.19	1.54	3	178.1
Rotorua	980	53.4	+ 0.0	79.0	38.0	6.68	20	+ 1.68	1.24	3	180.7
Gisborne	12	57.5	+ 1.2	87.1	37.0	3.87	15	+ 1.63	1.24	4	219.8
New Plymouth ..	160	54.0	— 0.3	63.2	41.5	9.40	23	+ 3.83	1.34	13	140.1
Napier	6	57.2	+ 0.8	87.7	39.4	2.28	15	+ 0.36	0.87	3	209.1
Taihape	2157	49.1	— 0.7	74.0	32.0	4.89	22	+ 1.53	0.85	3	
Wanganui	72	54.4	— 0.4	71.9	38.0	4.81	21	+ 1.46	0.68	22	186.7
Palmerston North	110	53.0	— 0.8	68.5	34.7	4.78	22	+ 1.23	1.11	23	159.1
Waingawa	350	52.6	— 0.4	72.8	28.3	2.43	21	— 0.47	0.47	16	178.1
Wellington	415	52.3	— 0.7	66.6	37.0	4.43	17	+ 0.54	0.94	22	169.5
Nelson	24	53.0	— 1.1	71.2	33.9	2.36	10	— 1.18	0.85	22	216.5
Blenheim	12	53.6	— 0.3	74.7	29.8	1.92	11	— 0.23	0.73	22	218.3
Hokitika	12	49.2	— 1.6	61.7	31.0	15.05	21	+ 3.69	2.21	13	153.6
Hanmer Springs ..	1225	49.6	— 1.0	78.1	27.0	2.55	16	— 1.34	0.38	22	177.1
Christchurch ..	22	53.2	— 0.2	83.0	32.5	0.75	14	— 1.11	0.14	13	180.7
Ashburton	323	51.5	— 0.1	82.8	31.0	1.19	10	— 1.01	0.27	16	181.1
Timaru	56	53.1	+ 0.5	88.6	31.2	0.74	7	— 1.12	0.22	24	198.3
Alexandra	520	52.0	— 0.2	81.2	29.2	0.94	13	— 0.29	0.33	22	215.3
Taieri	80	49.6	— 1.5	82.3	28.6	2.46	20	+ 0.27	0.36	23	
Invercargill ..	32	49.6	— 1.1	76.0	29.5	5.09	20	+ 1.42	1.27	19	

WATERING THE HOME GARDEN IN DRY WEATHER



though watering or irrigation is not perhaps the ideal method of combating soil dryness, it is usually the most generally acceptable to the home gardener. Suitably-spaced, moderate falls of rain are usually too much to expect during the summer, and the home gardener generally has several alternative methods to use in trying to overcome the dryness of the soil. He can put down a mulch with grass clippings or similar leafy waste, he can build up the humus content of his soil so that it will not be affected by any but the longest drought, or he can water or irrigate. When water is necessary it should be applied generously. It is a mistake to water the surface and allow the lower levels to remain dry. Unless it is done for a long time, playing the hose on the garden usually just wets the surface. It is best to draw a shallow drill with a hoe on either side of the row to be watered and fill it with water. The hose should be left running for a time so that the ground is thoroughly soaked. It is sometimes necessary to make holes with a fork along the line of the drill to facilitate penetration of the soil with the water. Caution is necessary to avoid overwatering retentive clays where the subsoil is poorly drained. Clay soils can sometimes be improved by the incorporation of fairly-coarse sand. A good supply of humus is also advisable. Because of the fineness of the particles, the correspondingly-greater amount of surface offered by a given quantity of fine as against coarse soil, and the greater cohesion of fine particles as the result of the narrower spaces between them, the fine particles making up a clay soil have a much greater capacity for holding moisture and for capillary action (that is, drawing water up from the subsoil) than coarse soils. They are, however, usually difficult to drain because of their water-holding capacity.

Effective systems of irrigation can be adopted where field pipes are available and there is ample water. One of the simplest suited to small, sloping areas where the soil is of an open nature is to sink pipes or bottomless tins vertically in the ground so that water can



Watering is often one of the less satisfactory methods of overcoming drought conditions, but where necessary it should be done thoroughly. The soil should be soaked rather than merely wetting the surface by playing a hose on it. The pipe method of irrigation shown in the upper illustration is useful on sloping ground for allowing water to reach the subsoil (D). The pipes are spaced as shown and are sunk almost flush with the ground. If pipes are not available, long bottomless tins can be used. Two tins placed together (C) are useful for reaching the required depth. An alternative method is to make holes with a crowbar (A and B) and water into the holes. Where ground is sufficiently level crops should be irrigated by the method shown in the lower illustration. Drills are made at A, B, C, D, E, and F and are connected up by another drill (G) into which water is led through a hose (H).

be poured direct to the subsoil. Another is to lay pipes in the subsoil as for a drain, but to block the lower end and keep the pipes, which are covered at the joins with open material such as shingle, filled with water until the subsoil is thoroughly wet. Water can also be made to penetrate dry soil if holes are made with a crowbar, which is a useful method on sloping land.

Deep digging in winter should not, however, be overlooked; it will enable rain-water to penetrate deeply and to some extent later prevent its loss through soil cracking. The surface should also be kept loose by hoeing in dry weather.

Seasons in Northern Hemisphere

Many home gardeners in New Zealand refer to books or catalogues published in Britain or the United States of America. As the seasons and months given in these publications are for conditions in the Northern Hemisphere, the appropriate month for New Zealand conditions can be found from the following table:—

January	**July**
February	**August**
March	**September**
April	**October**
May	**November**
June	**December**

If any month in either column is assumed to be British or North American, the month given opposite will be comparable in New Zealand. Though these seasons are reversed, they are not, from a gardening point of view, exactly reversed. For instance, a gardening programme for February designed for northern Britain or northern United States would hardly be wholly appropriate for the corresponding month, August, in the Auckland Province.

Tables of Weights and Measures

The following tables of units of weights and measures are a useful reference for home gardeners.

Lineal or Long Measure

5½yds = 1 pole, rod, or perch.
4 poles = 1 chain.
40 poles = 1 furlong (⅛ mile).
8 furlongs = 1760yds. = 5280ft. = 1 mile.

In practice the word pole or perch is often used to mean square pole.

Square, Surface, or Land Measure

114 sq. in. = 1 sq. ft.
9 sq. ft. = 1 sq. yd.
30¼ sq. yds. = 1 sq. rod or sq. pole.
40 sq. rods = 1 rood.
4 roods = 4840 sq. yds. = 1 acre.
640 acres = 1 sq. mile.

An acre is roughly equivalent to a section 208ft. by 208ft. The average larger-sized home vegetable garden is about 1/16 acre (about 302 sq. yds.); that is, an area a little less than 45ft. by 65ft.

Avoirdupois Weight

16 drams = 1oz.
16oz. = 1lb.
14lb. = 1 stone.
2 stone = 1 quarter.
4 quarters = 112lb. = 1cwt.
1 cental = 100lb.
20cwt. = 2240lb. = 1 ton.
1 short ton = 2000lb.

These units are used to measure practically all goods.

Measures of Bulk or Capacity

A box 4in. x 4in. x 4in.* holds 1 quart.
A box 6in. x 6in. x 8in.* holds 1 gallon.
A box 12in. x 12in. x 15½in.* holds 1 bushel.

* Internal measurements.

A full-sized apple case provides a convenient bushel measure in the home garden.

4 gills = 1 pint (pt).
2 pints = 1 quart (qt).
4 quarts = 1 gallon.
2 gallons = 1 peck (pk).
4 pecks = 1 bushel.
8 bushels = 1 quarter.

The gill is used for liquids; pecks, bushels, and quarters for dry commodities.

Measures of bulk or capacity should not be confused with measures of weight. For example, a gallon of nicotine sulphate weighs about 8lb.; a gallon of water at 62 degrees F. 10lb. A pint of french beans weighs about 14½oz., a pint of beet about 4½oz. and a pint of lettuce about 8oz.

Conversion Tables

1in. = 2.54 centimetres.
1 centimetre = 0.3937in.
1in. = 25.4 millimetres.
1 millimetre = 0.03937in.
1ft. = 30.48 centimetres.
1 metre = 39.37in.
1 sq. in. = 6.452 sq. centimetres.
1 sq. centimetre = 0.1557 sq. in.
1 sq. metre = 1.19 sq. yd.
1 hectare = 2.47 acres.

Data For Spray Mixing

1 imperial gallon = 0.1604 cub. ft. = 277 cub. in. = 10lb. of distilled water.

1 gallon = 4 quarts = 8 pints = 160 fl. oz.

Different liquids vary in weight and may weigh more or less than a gallon of water.

1 pint = 20 fl. oz.

1 kerosene tin = 4 gallons if filled to 1in. of the top.

1 American gallon = 0.83 imperial gallon (about 4/5).

6 American gallons = 5 imperial gallons.

1 imperial gal. = 4.543 litres.

1 litre = 1.76 pints.

7 teaspoons = 1 fluid oz. = 28.5 cubic centimetres approx.

1 : 25 is approximatety 1 pint of specific to 3 gallons of water (24 pints).

1 : 50 is approximately ½ pint to 3 gallons.

1 : 100 is approximately 5 fl. oz. to 3 gallons (480 fl. oz.).

1 : 150 is approximately 3 fl. oz. to 3 gallons.

1 : 200 is approximately 2½ fl. oz. to 3 gallons.

1 : 600 is approximately 1 fl. oz. to 4 gallons (640 fl. oz.).

1 : 800 is 1 fl. oz. to 5 gallons.

1 : 1000 is 1oz. or 1 fl. oz. to 6¼ gallons of water.

1 : 2000 is ½oz. or ½ fl. oz. to 6¼ gallons of water.

Tables for Spray Materials and Fertilisers

1oz. crushed bluestone = 1 tablespoon + 1 teaspoon.

1oz. hydrated lime = 3 tablespoons + 1 teaspoon.

1oz. crude naphthalene = 3 tablespoons.

1oz. paris green = 1 tablespoon + 1½ teaspoons.

1oz. arsenate of lead = 3 tablespoons + 1 teaspoon.

Number of Level Tablespoons of Fertiliser per Ounce

Bone meal	3½
Blood and bone	4
Lime (hydrated)	3 + 1 teaspoon
Lime (carbonate)	2½
Nitrate of soda	2
Potash (sulphate)	3½
Potash (muriate)	4
Sulphate of ammonia	2½
Sulphate of iron (not calcined)	2½
Superphosphate	3

As the sizes of spoons vary, these tables are only approximate. They are convenient for general purposes, but should not be used if absolute accuracy of quantities is important.

Broadcasting Fertiliser

About ½lb. per sq. yd. (actually 7½oz.) = 1 ton per acre.

1oz. per sq. yd. = approximately 3cwt. per acre (actually 302½lb.).

Drilling Fertiliser

Applied to Rows 3ft. apart

1oz. to 8 lineal feet of row = 1cwt. per acre.
2oz. to 8 lineal feet of row = 2cwt. per acre.

Applied to Rows 2ft. 6in. apart

1oz. to 9½ lineal feet of row = 1cwt. per acre.
2oz. to 9½ lineal feet of row = 2cwt. per acre.

Applied to Rows 2ft. apart

1oz. to 12 lineal feet of row = 1cwt. per acre.
2oz. to 12 lineal feet of row = 2cwt. per acre.

Estimating Production as Yield per Acre

By weighing the produce of an average square yard of his crop (or by weighing produce from several square yards and working out the average) and using the following table the home gardener can learn approximately what his yield per acre will be. The table is based on the assumption that every square yard in the acre is productive, whereas in actual practice headlands may not be planted and wide spaces left for carting produce off.

Weight of produce from 1 sq. yd.	Yield per acre tons	cwt.	lb.
1lb.	2	3	24
3lb.	6	9	72
5lb.	10	16	8
7lb.	15	2	56
9lb.	19	8	104
11lb.	23	15	40
14lb.	30	5	0

Journal of the British Grassland Society
(Editor: DR. H. I. MOORE)

This Journal is the medium through which British workers on grassland and related problems give the results of their experiments and their views and experiences on questions of current interest. It is designed to supply information of value and interest both to technical specialists and the practical farmer.

CONTENTS OF VOL. 3, No. 2, 1948:

THE GRASSLANDS OF NORTHERN IRELAND—P. A. Linehan, S. McConaghy, & R. H. Stewart.
GRASSLAND OUTPUT ON A DAIRY FARM IN COUNTY ARMAGH—R. R. Turner.
GRASSLAND CHANGES IN THE WINSLOW AREA, BUCKINGHAMSHIRE, 1935-1947—A. G. Davis.
UNDERGROUND DEVELOPMENT AND RESERVES OF GRASSES—H. Weinmann.
PROVIDING FORAGE FOR THE DRY SEASON IN EL SALVADOR—James M. Watkins and Armando Chavez.
STUDIES ON THE BIOCHEMISTRY OF PASTURE PLANTS. 1. A New Technique for the Preparation and Preservation of Herbage Samples.—A. W. Davies, R. A. Evans, and W. Charles Evans.
BRITISH GRASSLAND—PRESENT PROBLEMS.
RESEARCH AND PROBLEMS OVERSEAS.
BOOK REVIEW.
FINANCIAL STATEMENT.

Subscription to Vols. 2 and 3 is twenty shillings sterling (Vol. 1, ten shillings), and is payable to the Secretary, British Grassland Society, Agricultural Research Building, Penglais, Aberystwyth, Wales.

FOOT-ROT IN SHEEP CAN BE ERADICATED

By J. F. FILMER, Director, Animal Research Division,
Department of Agriculture, Wellington.

OF all the diseases which afflict man and beast in New Zealand none, with the possible exception of the common cold, causes more inconvenience and economic loss than foot-rot of sheep. Although these two complaints have little in common, the attitude of the farmer to foot-rot in his sheep is very reminiscent of the reaction of the average man to a cold.

MOST people adopt no special treatment against a cold. They carry on their normal daily life and thus transmit the infection to the maximum number of their fellows. Some may purchase a patent remedy or imbibe a home-made decoction, but only a small minority stay at home and call in medical assistance. Whatever the mode of treatment, there is very general agreement that it is quite time the medical profession discovered effective methods of preventing and curing colds.

Some owners of sheep affected with foot-rot belong to the non-intervention school. They believe that there always has been foot-rot, there always will be foot-rot, and that therefore it is not reasonable to expect that their sheep should escape foot-rot. In any case, they say, New Zealand pastures are so good that sheep do not have to travel far for a feed; in fact, if they cannot walk, they will get on quite well on their knees. Fortunately such sheep farmers are only a very small minority. More numerous are those who purchase patent foot-rot remedies which rival in number and variety the widely-advertised host of cough cures. Veterinary advice is seldom sought, probably because sheep farmers believe that the veterinary profession is just as impotent in regard to foot-rot as the medical profession appears to be in regard to the common cold.

Foot-rot Can Be Cured

There are, however, at least four good reasons why foot-rot should be removed from the group of diseases which must be endured because they cannot be cured:—

1. **The cause of foot-rot is known.**
2. **Unlike the common cold, foot-rot does not run a well-defined course and clear up without treatment.**
3. **There is a simple and effective method of treating foot-rot.**
4. **It is possible to eradicate foot-rot from any flock and to prevent its reintroduction.**

Investigation of Disease

Foot-rot must have been one of the first diseases of sheep to be seriously investigated, and research into it has been more or less continuous since very early in the 19th century. These investigations culminated in the discovery in Australia of the true cause of foot-rot, and this enabled effective means of control to be devised.

Although there are still some farmers who consider that foot-rot is caused by continued exposure to moist conditions, it was demonstrated as early as 1892 that foot-rot could not be produced by standing sheep for long periods in water or mud. Australian investigators confirmed this by standing sheep in water for 8 hours daily for several weeks and by fitting them with canvas boots which were filled with water daily for several weeks. In no case did foot-rot develop.

A French investigator in 1810 demonstrated that foot-rot was infectious and since then a number of workers in England, America, and Australia have shown that it can be set up by scratching the skin between the claws and rubbing in matter taken from a natural case.

For many years it was thought that a germ commonly known as the necrosis bacillus was responsible for foot-rot because it could generally be found in affected feet. This germ is very widespread and can nearly always be found in animal droppings, where it can live for long periods. The theory that foot-rot was due to the necrosis germ made it hopeless to try to prevent foot-rot, as it would be quite impossible to prevent sheep's feet from contact with infected droppings. More recent investigations, however, showed that typical foot-rot could not be produced by inoculation of a pure culture of this germ.

Then in 1938 Beveridge in Australia found a germ which he called "organism K", probably because it is shaped a little like a capital K drawn with a leaky fountain pen. It has since been given a much longer name, but it will still produce foot-rot in sheep. Alone it usually produces only mild cases, but in conjunction with another germ it regularly produces typical severe foot-rot when rubbed into scratches between the claws of sheep's feet.

A long and careful study of these newly-found germs showed that they behaved quite differently from the necrosis germ. Although the K germ can live and multiply for years in a diseased foot, it cannot live elsewhere for more than a few days. This fact was established by a number of very interesting experiments.

Matter collected from cases of foot-rot was applied to the scratched skin between the claws of sheep's feet after being kept for different periods. It was tried alone, mixed with mud, and mixed with moist droppings. When the matter was applied within a day of its collection foot-rot resulted in almost every case. As the time of keeping lengthened so the percentage of cases fell. No cases occurred after a fortnight and very few after a week.

The experiments were then tried under more natural conditions. Sheep with bad foot-rot were kept in muddy yards for a week and then removed. Twenty-four hours later healthy sheep were introduced. In three such experiments foot-rot occurred in the healthy sheep only once.

Experiments were then tried in small ¼-acre plots of irrigated pasture. In the first experiment six plots were used. Six sheep with a total of 18 feet badly affected with foot-rot and two healthy sheep were rotated around these plots, spending seven days in each. Five healthy sheep were rotated around the same plots, starting seven days after the affected sheep had left the first plot. Each plot was thus occupied for seven days by infected sheep, was empty for seven days, and then occupied for seven days by the healthy sheep. At the end of the experiment the two healthy sheep which went round with the five infected sheep were both badly affected with foot-rot. The five healthy sheep which followed after the plots had been spelled for seven days remained quite healthy. The experiment was repeated with 11 similar ¼-acre plots, but in this case both the grazing and the spelling periods were reduced to five days. Again the sheep which followed the affected sheep remained healthy. It thus became apparent that foot-rot infection does not live in even green pasture for more than seven days.

It was therefore decided to use this knowledge in trying to clean up foot-rot in an 18-acre paddock on an irrigation farm in which previously 60 to 70 per cent. of sheep had been affected with foot-rot at all times of the year. The paddock was spelled for two weeks and then stocked with 200 ewes whose feet were all examined to make sure that they were free from foot-rot. These ewes had to be taken out of the paddock on a number of occasions for shearing, dipping, etc., and before they were returned to the paddock they were passed through a foot-rot bath. During 22 months' observations these ewes and their lambs remained completely free from foot-rot.

On another property where foot-rot was very bad 15 acres was fenced off in a paddock of 170 acres, and to make doubly sure the 15-acre enclosure was kept free from sheep for six weeks. It was then stocked with 50 of 73 hoggets which had been examined to ensure they were free from foot-rot. The remaining 23 hoggets were run outside the test paddock with the original infected flock, and eight months later six of the 23 were suffering from foot-rot. The 50 hoggets in the affected area which had been spelled remained quite free from foot-rot for 18 months, although they were separated by only a wire fence from infected sheep.

This last experiment was completed in 1939. Since then foot-rot has been eradicated from a number of Australian properties, some of which carry up to 30,000 sheep.

New Zealand has been very slow to profit from the Australian investigations, the results of which had all

THE
NATIONAL
BANK
OF NEW ZEALAND
LIMITED

THE

NATIONAL

BANK

OF

NEW ZEALAND

LIMITED

With its Head Office in London and agents throughout the world, the National Bank is equipped to meet all your banking needs.

99 BRANCHES AND AGENTS

THROUGHOUT

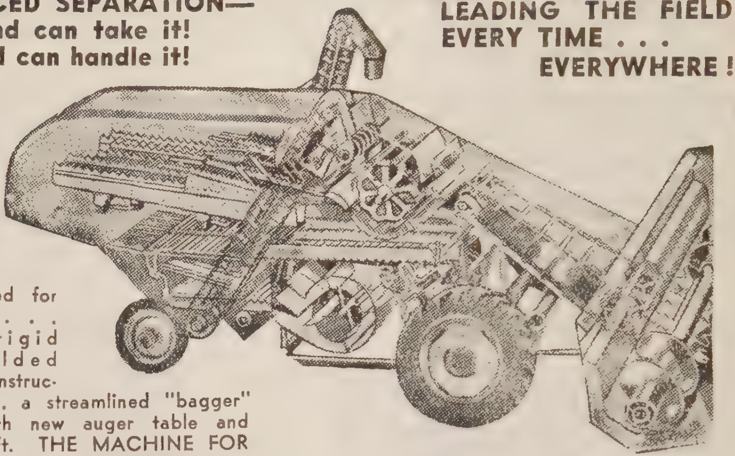
NEW ZEALAND

when you think of Self-propelled think of

MASSEY-HARRIS

LEADING THE FIELD EVERY TIME . . . EVERYWHERE !

BALANCED SEPARATION—
front end can take it!
rear end can handle it!

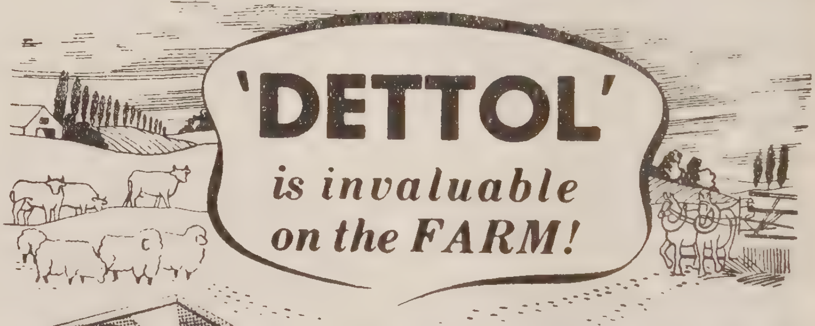


Fully tested for efficiency . . . featuring rigid and welded frame constructions . . . a streamlined "bagger" model with new auger table and electric lift. THE MACHINE FOR ALL HARVESTING CONDITIONS.

MASSEY - HARRIS CO. LTD.

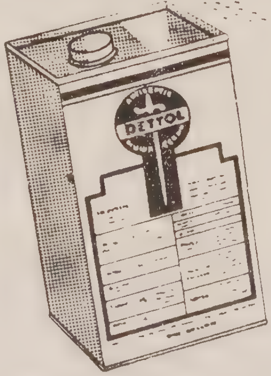
(IN ASSOCIATION WITH P. & D. DUNCAN LTD.)

Head Office: CHRISTCHURCH. Branches at: AUCKLAND, PALMERSTON NORTH, and DUNEDIN. AGENCIES EVERYWHERE.



'DETTOL'

is invaluable on the FARM!



'Dettol' has many outstanding advantages over old-style antiseptics. It retains its germicidal properties many hours after drying, even in the presence of pus, blood, serum and faeces. 'Dettol' is three times more powerful than pure carbolic acid, yet is non-poisonous and non-staining and is an excellent cleanser and deodorant.

Write to-day for FREE booklet, "'Dettol' in Veterinary Practice."

Obtainable in 1 gallon tins from your Veterinary Club or Stock and Station Agent or local Chemist.

'DETTOL'

TRADE MARK

THE MODERN ANTISEPTIC

As supplied to the Royal Veterinary College, London.

RECKITT & COLMAN (NEW ZEALAND) LTD.
(Pharmaceutical Division), Bond St., Dunedin.

been published by 1941. Massey Agricultural College several years ago showed that control is possible in New Zealand by keeping a small experimental area free from foot-rot, although it was surrounded by paddocks containing infected sheep. In January, 1947, the Department of Agriculture eliminated foot-rot from its experimental farm at Manutuke, a little south of Gisborne. Although this is a small farm of only 68 acres, it frequently carries 600 sheep. Several lines of lambs totalling over 700 have been introduced for experimental purposes and about 6 per cent. of these were affected with foot-rot. By taking proper precautions, however, it has been possible to eliminate the disease from these lambs before they were released and there was not a single case in the paddocks between January, 1947, and July, 1948, when it was unfortunately reintroduced by a drover putting an affected hogget over the fence during the absence of the officer in charge.

Planning Eradication Campaign

Before starting a campaign to eradicate foot-rot from a property it is well to do a little planning. In the summer immediately after weaning is usually the best time for the job. The fat lambs have been sold and so do not complicate the work and generally there is less tendency for foot-rot to spread at this time. During the three months before the main operations every opportunity should be taken to reduce the incidence of foot-rot in the main flock by removing lame sheep and concentrating them in one or two paddocks.

In the conduct of the campaign itself there are four essential things to do:

1. **All foot-rot cases must be removed from the flock.**
2. **The clean sheep must be returned to paddocks which have been kept completely free of stock for at least a week.**
3. **The affected sheep must be disposed of or completely cured before they are returned to the flock.**
4. **Care must be taken to see that all newly-introduced sheep are free from foot-rot.**

Elimination of Foot-rot Cases

The removal from the flock of all foot-rot cases can be done thoroughly only by examining every foot of every sheep. The best method is to get as many men as possible to trim the feet with secateurs. The feet should then be inspected by one or more completely reliable men who should be responsible for deciding whether or not a sheep is affected. In making this decision it is necessary to look for three different forms of the disease. The usual form in which there is lameness, loose horn, and plenty of diseased tissue is easily recognised. In cases of the second type in which there is a small pocket of infection under the horn, the sheep may not be lame and infection can be detected only by removing all loose horn. This cannot be done with secateurs and the man making the final inspection will often need to complete the trimming with a knife.

It is especially important to detect these cases, as they may carry the infection for up to five months without lameness and then progress to the normal form of foot-rot and serve as centres of infection. In the third form all that is visible is a moist, hairless area of skin between the toes. The infection has been known to exist in these cases for as long as nine months. It is therefore important that they, too, should be detected and excluded.

As the cases of foot-rot are recognised they should be removed from the flock for treatment. It may be convenient to delay treatment and concentrate on getting the clean sheep back to the spelled paddocks, but in any case the affected sheep should be placed in a hospital paddock so situated that clean sheep do not pass through it at any time.

Clean Sheep to Spelled Paddocks

The clean sheep should pass through a foot-rot bath containing a solution of bluestone 1lb. to 1 gallon of water or formalin 2 gallons to 100 gallons of water before going to the spelled paddocks. The time spent in the bath is not important as long as the feet are thoroughly wet. One of the most convenient methods is to fill the bath and allow sheep to stand in it until another lot are ready. It is important to arrange the yarding of sheep in such a way that clean sheep do not go over races or paddocks which have been used by affected sheep.

Treating Affected Sheep

With the clean sheep passed through a foot-rot bath and placed in the spelled paddocks, the affected sheep may be concentrated on. The first step in treating foot-rot is to expose all diseased tissue by removing the covering horn, and this must be done with the utmost thoroughness. Some bleeding is bound to take place, and though this is not serious, it should be kept to a minimum, as it makes it difficult to find all the diseased areas. It should be remembered that no antiseptic can be effective unless it comes in contact with the diseased tissue.

Vaccination Against Contagious Abortion

APPLICATIONS by farmers for vaccination of their calves against contagious abortion in 1949 are now due. The charge is 1s. 6d. per calf for the first 14 calves in any herd and 1s. 3d. per calf thereafter. The closing date for applications is January 14 and a late fee of 10s. is payable on all applications received after this date.

As in previous years members of veterinary clubs should apply to the secretary of their club and other farmers should apply to their nearest Inspector of Stock, from whom they can obtain the necessary application forms. Applications to Inspectors of Stock must be accompanied by a cash payment calculated on the basis of the charges mentioned above.

It is desirable that applications be sent in as early as possible so that vaccinating officers can arrange the work efficiently. Farmers are therefore requested to forward their applications by December 31.

After their feet have been thoroughly pared the sheep should be put in the bath containing a solution of 3lb. of bluestone per gallon of water or 10 gallons of formalin per 100 gallons of water. (Note the increase in strength of solution over that used for healthy sheep.) Again the length of time sheep remain in the bath is not very important, but it is absolutely necessary to see that the affected feet are thoroughly wet. As sheep tend to hold up the affected foot, this must be watched for carefully, and if necessary the foot must be held down in the bath for about 10 seconds.

After treatment affected sheep are put in the hospital paddock already described. They should be brought in for examination at intervals of not more than a week. On these occasions it may be necessary to remove further loose horn missed at the previous treatment. If there is any sign of disease remaining, the sheep must be returned to the hospital paddock after going through the bath.

When a treated sheep appears to be completely cured it should go through the bath and be placed in another isolation paddock which may be called the convalescent paddock. Sheep from this paddock should be brought in for examination every week. If the slightest sign of disease is detected, they must be retreated and returned to the hospital paddock. If a sheep is completely sound after one week in the convalescent paddock it should be raddled, passed through the bath, and returned to the convalescent paddock. If on examination at the end of a further week the raddled sheep is still quite sound, it may be allowed to rejoin the main flock after passing through the bath. It must be emphasised that the examination of sheep for soundness means thorough examination of each foot, with paring if necessary. Mere absence of lameness means nothing.

There will generally be a few affected sheep which resist treatment, and unless they are particularly valuable, it is best to kill them for dog tucker rather than to persist in treatment. After all affected sheep have been cured or killed the hospital and convalescent paddocks should be spelled for a fortnight before being used for clean sheep.

If the procedure described is carefully followed, no further foot-rot cases will occur. It is possible, however, that a carrier may be missed and foot-rot will again appear in one of the paddocks. If this occurs, it is not sufficient to treat the affected sheep; all sheep in the paddock must be brought in to go through the original process of examination and treatment, and the paddock concerned must be spelled for a week before being reoccupied.

New Sheep must be Examined

After foot-rot has been eradicated it is important not to reintroduce it. The most likely way of doing this is by buying affected sheep. All newly-purchased sheep must therefore be dealt with in the same way as the original flock and no sheep should be allowed into the clean paddocks until each of its feet has been examined and found to be sound. It is unlikely that foot-rot will be introduced by animals other than sheep, with the exception of goats, which can be infected and must be treated in the same way as sheep.

Readers may conclude that eradication of foot-rot is difficult and complicated. It would be fatal to pretend that it is easy, but it is worth while. By a concentrated effort it is possible to eliminate foot-rot and so do away with the constant worry of nursing and treating affected sheep, and in addition the production of wool and mutton will be considerably increased.

Summary

Foot-rot can be eradicated from any property by the following procedure:

1. **Every foot of every sheep must be carefully pared with secateurs and knife.**
2. **A thoroughly reliable person must remove all sheep affected with foot-rot.**
3. **The clean sheep must pass through a bath containing 1lb. of bluestone to 1 gallon of water or 2 gallons of formalin to 100 gallons of water and go into paddocks which have been free of sheep for one week.**
4. **Affected sheep must be treated by removal of all loose horn and immersion of all feet in a bath containing 3lb. of bluestone to 1 gallon of water or 10 gallons of formalin to 100 gallons of water, and go into a hospital paddock. They should be treated weekly until sound and then go into convalescent paddocks.**
5. **Sheep in the convalescent paddock should be examined and passed through a bath at weekly intervals. After remaining sound for a fortnight they may rejoin the flock.**
6. **All newly-purchased sheep must be treated in the same way as those of the original flock.**
7. **If foot-rot reappears in any paddock, all sheep in that paddock must go through the whole of the original procedure.**

◆

Radio Broadcast

A RADIO broadcast to farmers, "Current Farming Problems," will be given from Station 1YA Auckland by J. E. Bell, Fields Superintendent, Department of Agriculture, Auckland, A. J. Kerse, Fields Instructor, Department of Agriculture, Auckland, and H. Woodyear-Smith at 7.15 p.m. on December 6.

◆

Rack for Feeding Hay to Sheep

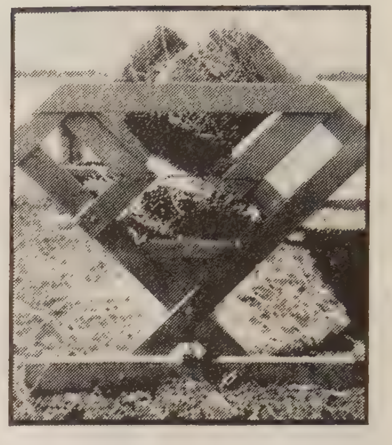
By R. INCH, Fields Instructor,
Department of Agriculture,
Ashburton.

MANY farmers find difficulty in feeding hay economically to sheep. Either it is put into racks that allow a considerable amount to be pulled on to the ground and soiled, or it is spread thinly in long rows across the field. The latter method is possibly less wasteful, especially with meadow hay, but when good clover or lucerne hay is used the leaf tends to fall and be wasted as the sheep scramble over the rows.

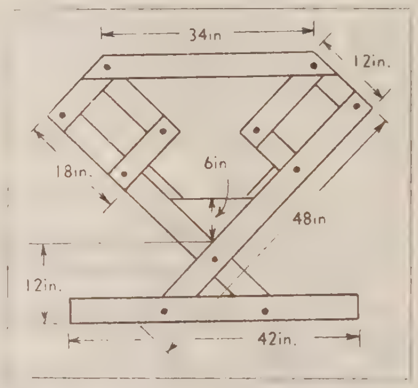
THE leaf is the most valuable part of good hay, and farmers who wish to save as much of it as possible may find that the type of rack used by a mid-Canterbury farmer will solve their problem. It also assists in keeping the wool free from dust and small ends of straw.

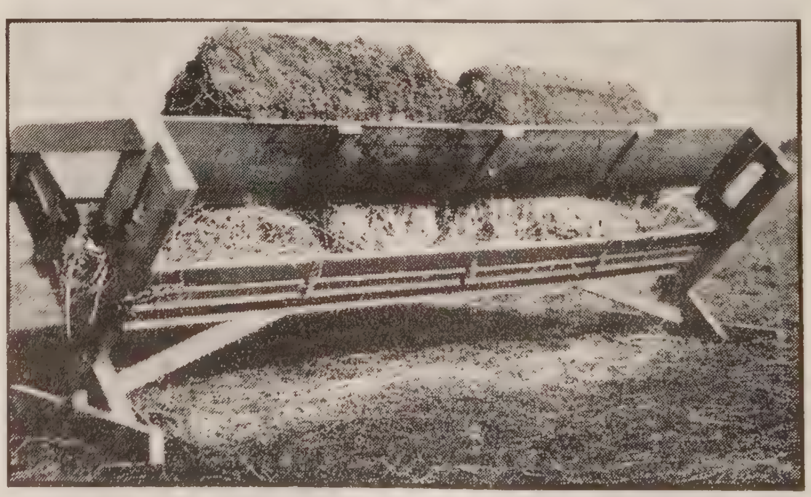
The key to the construction of the rack is the peculiar shape and size of the end supports. They are made from 4in. x 2in. timber bolted together, the rack being 10ft. long. The bottom trough supports the hay and holds any leaf that may fall; the top is used for storage and acts as a self feeder. When the feeder is filled extra bales can be placed right across the top and opened as required.

This feeder is ideal for small flocks, especially of stud sheep that are fed on the better class of hay. It is strongly constructed and with ordinary care will last for many years.

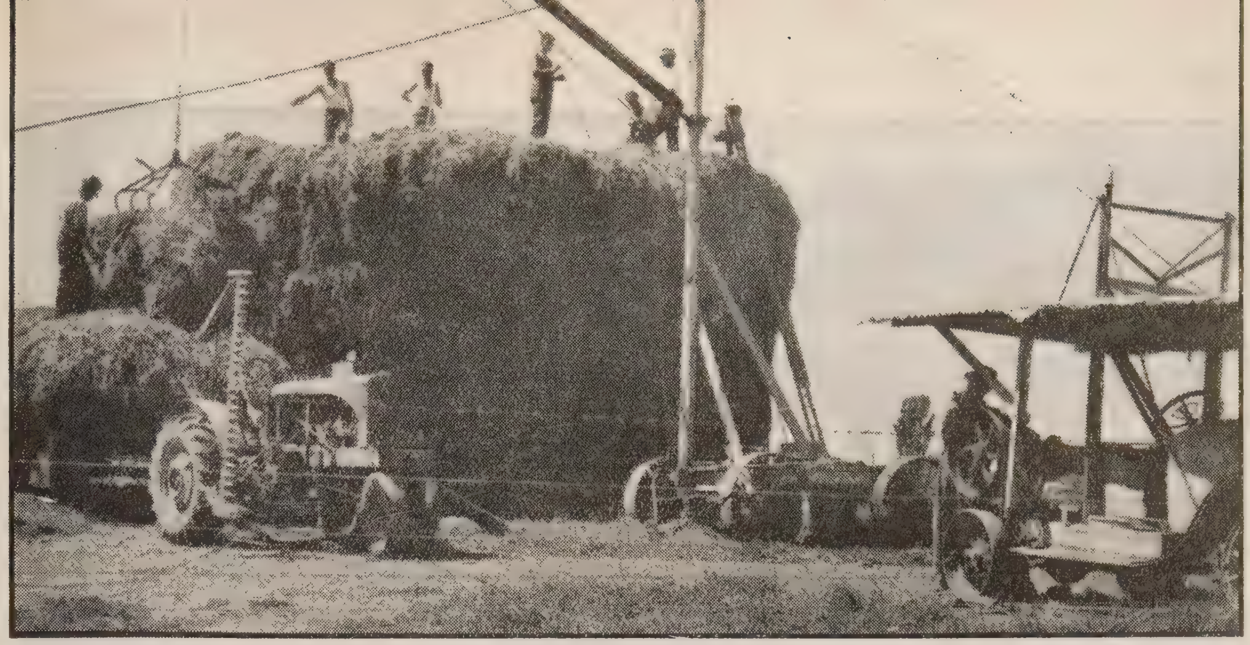


The key to the construction of the rack is the peculiar size and shape of the end supports, which are made from 4in. x 2in. timber to the dimensions given in the diagram below.





The bottom trough supports the hay, while the top is used for storage and acts as a self feeder.



Mechanical Aids to Silage Making

WITH the arrival of spring, dairy farmers once more will be concerned with the control of surplus pasture growth. In the past silage making has been regarded as a most laborious task and that has deterred some farmers from saving surplus grass. Mechanical aids have done much to reduce the toil of silage making and farmers not conversant with the machines now in use should read the article "The Making of Stack Silage," by A. C. Burgess, in the November, 1947, issue of the "Journal." In the following article further mechanical aids developed by the owners of Devonvale dairy farm, Belfast, Canterbury, are described by C. J. Crosbie, Farm Machinery Officer, Department of Agriculture, Christchurch, to enable other farmers to profit from their experiences and so lighten what can be very heavy work.

UNDER New Zealand conditions half the yearly growth of a pasture occurs in October, November, and December, and about two-fifths of that growth is not required by the herd. The saving of surplus spring growth to be used as winter feed is an important feature of farm management. As the weather is uncertain at this time of the year, the making of silage offers the best opportunity for effecting this saving.

Mobile Stacker

Several stackers on the New Zealand market have been specially designed to reduce the time and labour involved in setting up and dismantling them. In general, the mast or pole is set on and braced to a triangular base, which may be fitted with either skids or small wheels so that the stacker may be towed from stack to stack without dismantling it. However, it is still necessary to peg this triangular base firmly to the ground on arrival at a working site and to lift the pegs before the stacker can be moved. On hard soil this involves much work with a maul or sledge hammer, and to obviate this the owners of Devonvale farm have mounted their stacker on a heavy wheeled trolley which relies on weight alone to prevent the unit moving when it is operating at the base of a stack.

An old metal hopper, formerly a horse-drawn vehicle for road-construction work, was bought cheaply at an auction sale, and on it was mounted the stacker mast. The hopper was stripped to the bare chassis and a wooden decking fitted. The mast was bolted to one corner of the decking and stayed by bolting on two 6in. x 2in. wooden braces at right angles to each other. A 26ft. boom was fitted in the usual way, and a block and tackle is used to alter the height of the boom as the stack grows. One guy rope is placed opposite the point where the grab is loaded and another opposite the stack to take the strain when the grab swings across the stack. A third guy rope is also provided, mainly for safety on the stack when a strong wind is blowing.

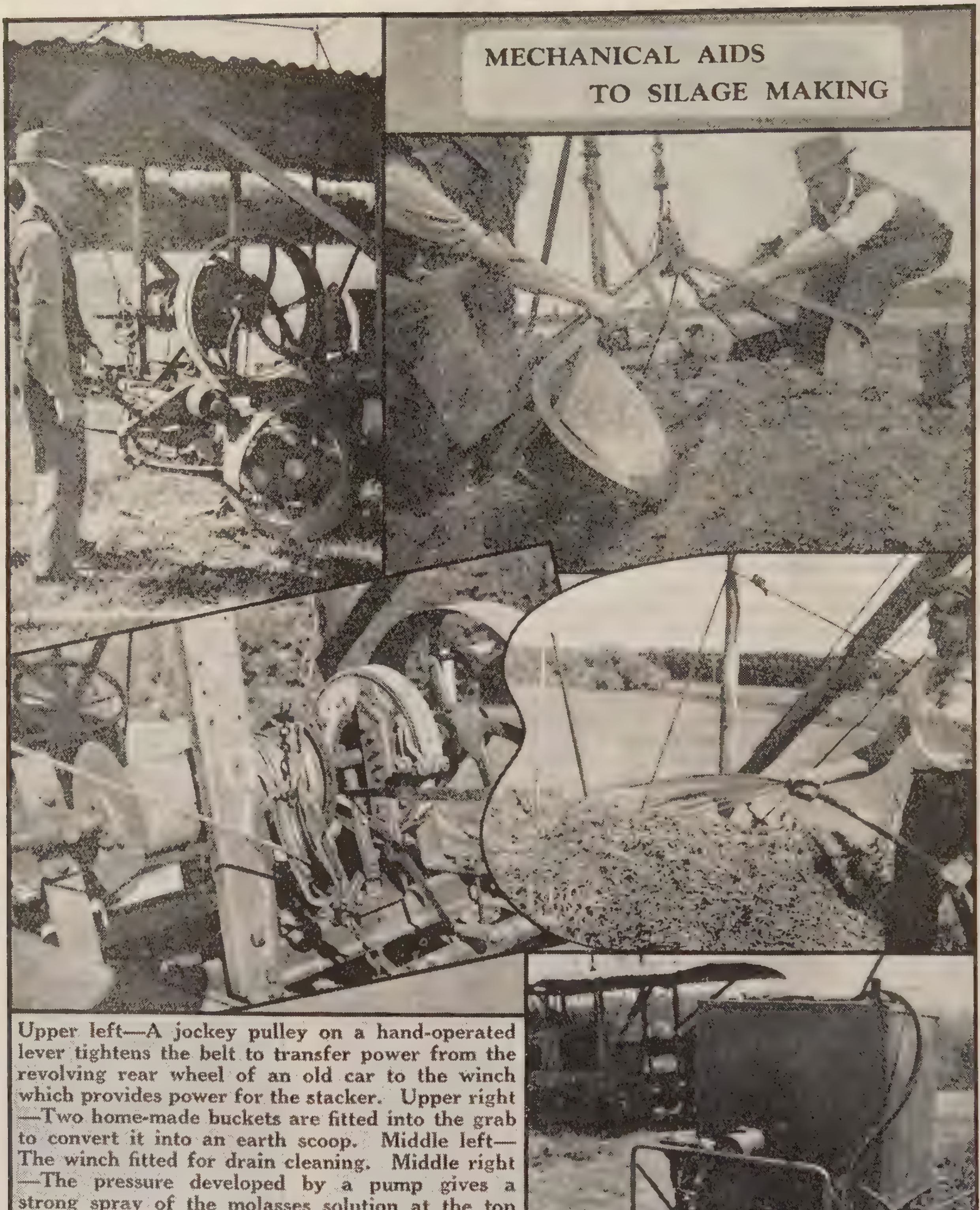
Farmers intending to build such a stacker should first ascertain the height of local power and telegraph lines. Plenty of clearance should be provided over the top of the mast, as power lines sag. At least one farmer's death has been caused by a stacker coming in contact with power lines, and several others have had severe shocks.

Controlling the Grab

The grab, and therefore the boom, are usually controlled from the ground by means of the grab trip rope. Though that may be effective in most cases, there is an element of danger in this method of control when a strong wind is blowing. On such days the boom is blown across the stack ahead of the loaded grab and, when the grab is tripped, in many cases the trip rope has to be slackened to release the load. The grab and boom are then momentarily out of control, for when the rope is slackened preparatory to being tripped the grab swings wildly under the boom, to the grave danger of the stack builders. When the grab is tripped it swings about again as the weight of the load of grass is released, mainly because by this time the ground operator has

An old metal hopper such as this was bought cheaply at an auction sale and stripped down to make a mobile mounting for the stacker shown above.

MECHANICAL AIDS TO SILAGE MAKING



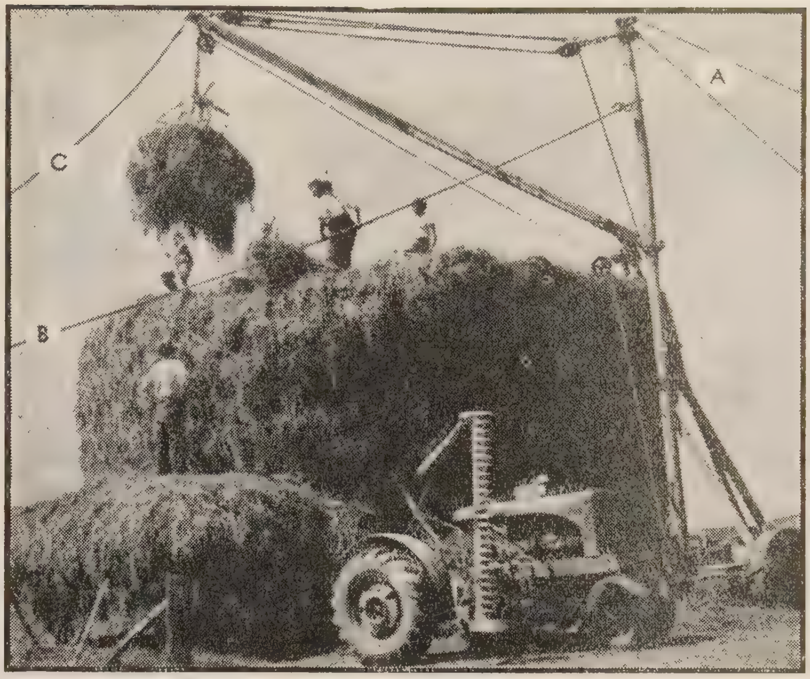
Upper left—A jockey pulley on a hand-operated lever tightens the belt to transfer power from the revolving rear wheel of an old car to the winch which provides power for the stacker. Upper right—Two home-made buckets are fitted into the grab to convert it into an earth scoop. Middle left—The winch fitted for drain cleaning. Middle right—The pressure developed by a pump gives a strong spray of the molasses solution at the top of the stack, which greatly assists toward a good covering of the freshly-added grass. Lower—A 200-gallon tank on a wheeled chassis holds the mixture of molasses and water, which is forced to the top of the stack by an engine-driven pump.

a firm strain on the rope to hold the grab and the boom against the wind. Thus, on a windy day the grab is a dangerous piece of machinery and, unless handled by experienced operators, can cause bad accidents.

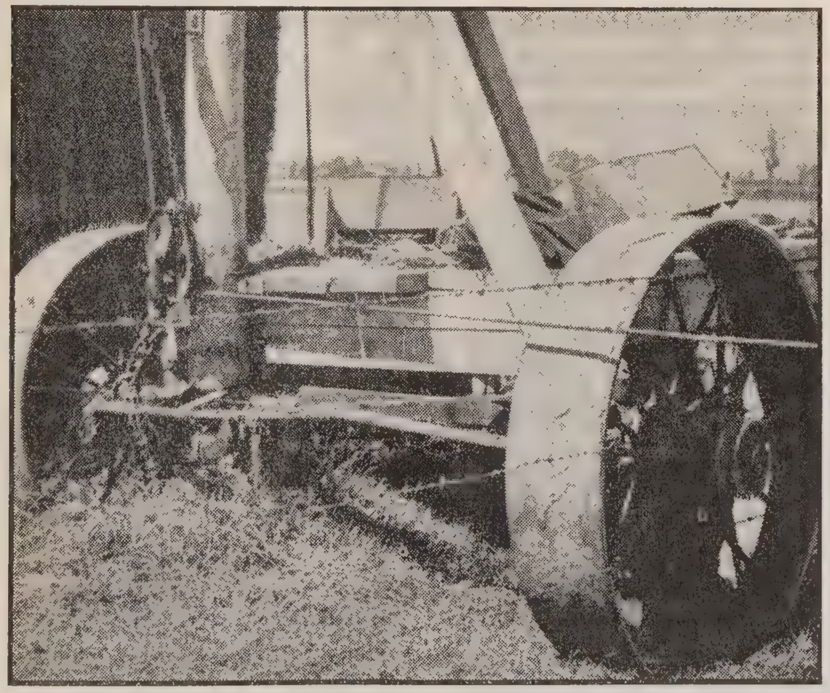
On Devonvale farm this danger has been obviated by attaching the control rope to the boom only. The boom is then under control at all times and is allowed to swing across the stack or is pulled back over the loading point at will, irrespective of the velocity of the wind. A short trip rope is attached to the grab, which is tripped by one of the stack builders. In this way the grab load is dumped wherever and whenever it is required on the stack by the person on the spot. It has been found that this method of tripping the grab makes for faster and quieter working than the old method of shouting commands from the top of the stack to the trip rope operator on the ground.

Power for the Grab

In the past it has been usual for the grab to be raised and lowered by means of a wire rope attached to a horse, but that system is rapidly falling into disfavour. Stack builders have been known to suffer nasty accidents through being hit in the face or head by the sharp prongs of the grab, usually as a result of the horse becoming stubborn about the number of forward steps required to raise the grab and not allowing for extra steps as the stack rises. Horses have also been known to step backward for no known reason, thus lowering an open grab on an unfortunate builder.



One of the two guy ropes A is placed opposite the point where the grab is loaded; the other is placed to take the strain when the grab and boom swing over the stack. A third guy rope (B) is fitted mainly for safety. The rope C is used to pull the stacker arm back over the silage on the trailer.



The front of the stacker trolley which was constructed on the chassis of an old metal hopper, showing the fitting of the decking, the foot of the mast, and its bracing. The single-sheave block through which runs the wire rope to the grab is attached with two short lengths of chain.

Stack workers feel happier when some mechanical means is used to raise and lower the grab. Cars, trucks, and light tractors have been used for this purpose to advantage. The rope is tied to the front of the vehicle which is put in reverse gear to raise the grab and into a forward gear to lower it. The driver has a full view of the grab at all times and is able to raise or lower it as required.

On this Canterbury farm a powered winch is used to raise and lower the grab, thus releasing the tractor for other work in connection with silage making. The winch, mounted across the back of an old car that is no longer fit for road work, consists essentially of a shaft on which is fitted a rope drum, a lever-operated brake drum with external contracting and internal expanding brake shoes, and a wide-faced pulley of large diameter. The internal shoes are operated by a separate lever, which works across a ratchet, so that the winch may be locked with the grab in any position if the winch operator has to leave his post. One back wheel of the car is fitted with a wide brake drum, and a wide belt transfers the power from there to the winch pulley. This belt is slackened or tightened by a hand-operated jockey pulley on a lever. The car wheel which drives the belt is jacked clear of the ground, the engine is started, the gears engaged, and the back wheel set spinning. The winch operator stands facing the stacker with his back to the winch, his left hand on the jockey pulley lever and his right on the brake lever. He then has full control over the winch and the grab.

There is a friction drive from the car wheel to the winch only when the grab is being raised. The weight of the grab is sufficient to unwind the winch and pull the wire rope through the blocks on the stacker. The hand-operated brake on the winch is used to control the rate of descent of the grab.

The old car uses only two gallons of petrol in four hours of this winch work. In view of the increased safety to the workers and the faster operation of the grab, it is considered that the construction of this home-made winch has been a profitable investment, and certainly it saves time. This power winch has other uses on the farm and does much to reduce the toil of what can be heavy tasks. With a mast and boom fitted to the chassis of the car the winch can be used to clear an overgrown drain with a special type of drag. The winch is also used with a special scoop to empty the cowyard sump and drains, the dung being loaded into a wheeled tank before being spread over the fields.

Pump for Molasses

Though good silage can be made from pasture herbage alone, the addition of molasses and acids has been shown to result in a reduction in the loss of dry matter during fermentation. To this end a number of New Zealand farmers have been adding molasses diluted with twice its weight of water to the grass as the stack is built—usually 3 or 4 gallons to each ton of grass. Whey paste diluted with water has also been used. Farmers who follow this practice will be interested in the machine these Canterbury farmers built to facilitate the use of molasses in silage making. They tried elevating the molasses to the stack in milk cans, after they had tried carrying it up in buckets, but discarded those methods as being too laborious in favour of pumping it up.

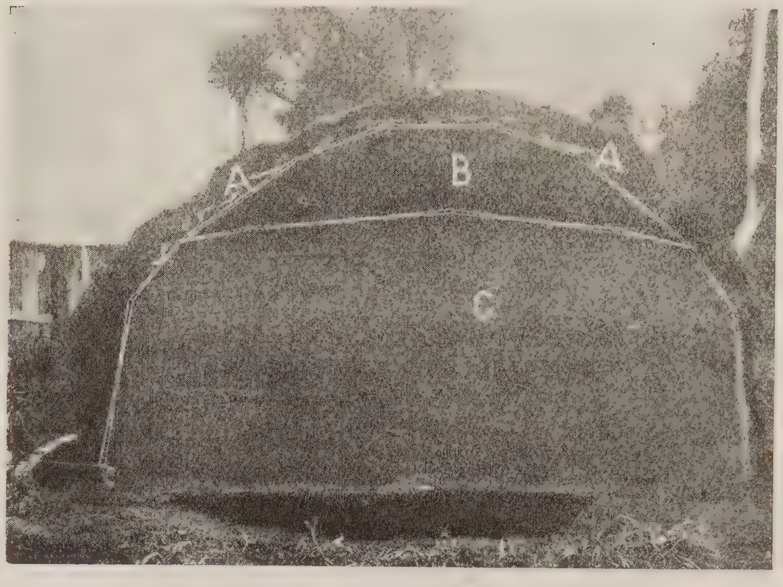
A 200-gallon square galvanised tank was fitted to a wheeled chassis, on the back of which is a centrifugal pump driven by a small petrol engine. The intake hose is passed into the tank through a hole in the top and the delivery hose is taken to the top of the stack. The molasses is mixed with the water at the cowshed, where hot water is available, and the tank towed to the stack site. Whenever molasses is required at the top of the stack, the small engine is started and the molasses is pumped up in a very short time. Spraying the liquid over the stack top to ensure a thorough coverage is simple.

Between stacking seasons both engine and pump have other uses on the farm.

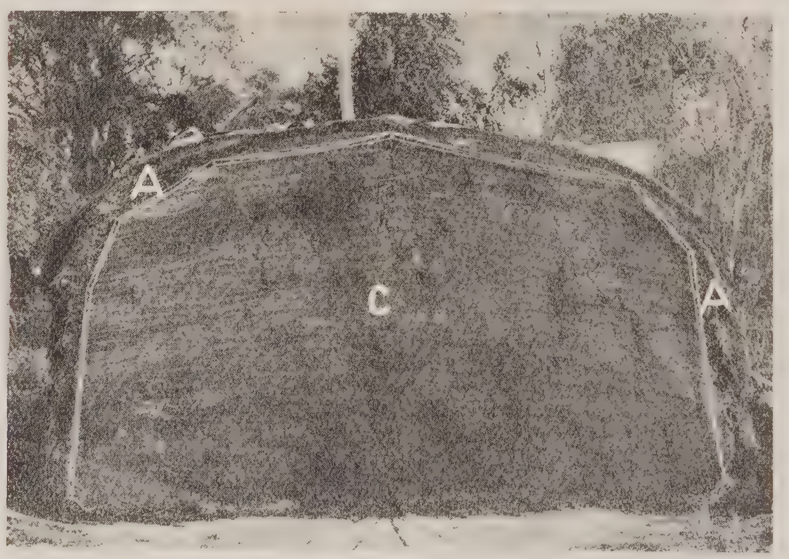
Covering the Stack

Some years ago silage makers in New Zealand were enthusiastic about the time and labour saved by not covering stacks with earth, but research work has demonstrated that this was a false economy, as is shown by the two photographs reproduced on this page.

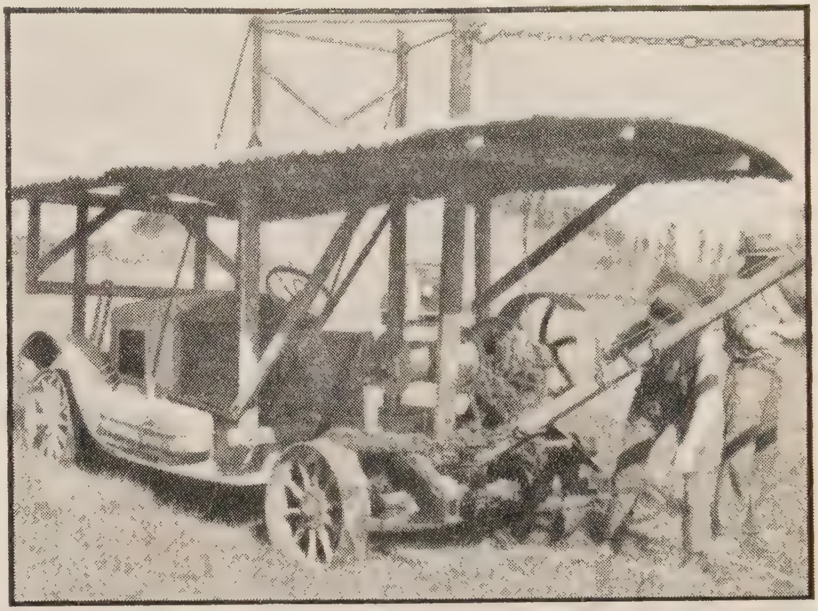
ADVANTAGES OF EARTH CAPPING ON SILAGE STACKS



Though time and labour may be saved by not covering silage stacks with earth, the amount of work is greatly reduced by the use of the mechanical aids described in this article, and the profiles of the two silage stacks illustrated demonstrate the value of earthing up stacks. That above was well hearted up but not covered, and that below was well covered with earth. A indicates inedible wastage; B silage which is edible but of low protein digestibility and very burnt; and C edible, light green-brown silage of higher digestibility than B. In the covered stack the amount of inedible wastage is much less, and the area of low digestibility is avoided.



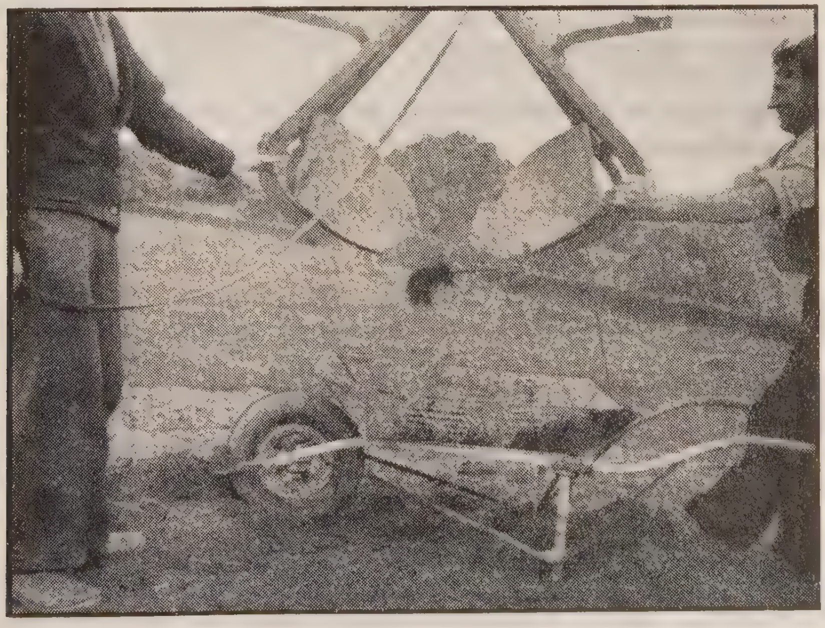
However, earthing up a stack, even by using an old milk can or half a 44-gallon drum in which to lift the earth, involves a lot of shovel work that can be avoided. These Canterbury farmers do not dig a pit at the stack site, but cart the required soil from a creek bank in drays and dump it in a heap at the stack site. An earth scoop is used to lift the soil to the stack top. The scoop was made by fitting two special buckets, made from sheet metal from old oil drums, to the grab that is used to lift the grass. The bottoms of the buckets are made to fit the curvature of the grab tines, which fit into three pockets welded to the base of each bucket. The back of each bucket is fitted to the grab with two hooked bolts which fit over the cross-brace of the grab. These two bolts pass through a strap of mild steel on the inside of the bucket to give it rigidity, and the leading edges of the buckets may also be strengthened if desired. The leading edges were fitted with flat steel teeth, two on one bucket and three on the other, which are 2in. wide and project about 3in. The teeth are staggered so that they mesh when the scoop is closed and so prevent leakage of soil when the scoop is being raised. The teeth also assist the penetration of the buckets into the heap of soil when the scoop is being filled. It would be possible to use this scoop where the soil is obtained from a pit at the foot of the stack if the soil were first loosened.



The winch fitted to an old car has other uses as well as providing power for the silage stacker. Fitted with a mast and boom it can be used for cleaning drains.

As the scoop can dump the soil on the stack top only on an arc described by the boom of the stacker, it is still necessary to shift some soil with a shovel when building up the edges of the stack. To reduce this shovel work to a minimum—and there can be a lot of it on a stack of 33ft. diameter—a small rubber-tyred barrow is used. The barrow is lifted on to the stack with the soil scoop, and when necessary the scoop is emptied directly into it. The soil is then easily moved to where it is required, for it is a downhill push to the edge of the stack, or should be if the stack has been properly hearted up.

It is felt that this method of earthing up the stack is still open to improvement, and it is proposed to discard the scoop in the coming season and replace it with two rubber-tyred barrows, which will be filled in turn on the ground and lifted by a bridle and three chains to the stack top, where the barrow will be unhooked and wheeled to where the load is needed.



Swinging across the top of the silage stack on an arc from the stacker mast, the scoop deposits soil in a small barrow which is used to move the soil to the edges of the stack, saving much shovelling.

Emphasis on Safety

This Canterbury family has developed these machines during the past 12 years with a view to reducing the drudgery associated with silage making, but the aspect which they regard with most favour is that the work is now much safer than it was previously. They are of the opinion that other farmers would do well to consider their machinery from this point of view.

No haymaking or silage season passes without some farmer being killed as a result of an accident. Between 1939 and 1946 14 men were killed by falling from a stack or load of hay, through a stack falling on a man, or by being pierced by a hay fork. The number of accidents where the injured men recovered is not recorded, but the ratio of accidents to deaths may well be in the region of 25 or 30 to 1.

It is essential that every care be taken and that all haymaking and silage-making machinery be thoroughly checked and serviced before the start of the season. Only in this way, and by exercising extreme care at all times, can accidents be avoided.

here's your winter feed

On the amount and quality of hay you save NOW will depend to a large extent how many stock you can carry through the winter and also your production next season.

WHEN YOU MAKE HAY, REMEMBER THESE IMPORTANT POINTS:—

Cut only as much hay at a time as can be properly handled during the curing stage by the machinery and labour available.

Cut at flowering stage when the greatest weight of nutritious material will be obtained.

Provide adequate protection of the hay in stack or bales from the weather.

BETTER FARM MANAGEMENT

means more production

WHERE BRITAIN STANDS WE STAND

ISSUED BY THE AID FOR BRITAIN NATIONAL COUNCIL

BT.13.24

Sub-irrigation of Glasshouse Tomatoes

THE possibilities of sub-irrigating glasshouse tomatoes have recently aroused interest among some growers, but so far few have departed from the normal system of watering with a hose, probably because comparatively little is known about the layout and operation of the sub-irrigation system and its advantages or disadvantages. F. L. Bailey, Orchard Instructor, Department of Agriculture, Tauranga, recounts the experience of growers who are using sub-irrigation for watering glasshouse crops.

THE purpose of sub-irrigation is to control the moisture in the soil so that during their growing period plants may have sufficient water conveyed to their roots without the soil surface being wet. Plants may be watered by sub-irrigation both in the field and in the glasshouse. In some overseas countries sub-irrigation is carried out in the field, but few, if any, attempts appear to have been made in New Zealand to water field crops by this method. Rainfall usually is sufficient in most districts to provide water for growing crops, but where irrigation of field crops is necessary the sprinkler or flooding systems have been considered cheaper and more satisfactory.

For crops grown under glass controlled irrigation is essential. Watering of glasshouse tomatoes is considered by most growers a somewhat tedious task, but a very important one. In large areas under glass watering in the normal way constitutes a major labour problem, so any methods by which that problem can be reduced and equivalent or even better results secured are worth consideration.

Two years ago a market gardener in the Levin district built a large, unheated glasshouse with the intention of growing two crops a year. As with other classes of industry, shortage of efficient labour was a difficult problem to overcome. Realising that watering of these crops with a hose would involve many days of work throughout the seasons, it was decided to water the glasshouse by sub-irrigation, which seemed to be one answer to this problem.

Pipelines and Reservoirs

Before the pipeline system was laid down care was taken to level the soil surface accurately. That was necessary to ensure that the field tiles could be laid evenly at the required depth.

During the construction of the glasshouse, which measures 230ft. by 30ft., five trenches were dug 5ft. apart and the length of the house. In each a line of 3in. field tile pipes was laid at a depth of 12in. at one end with a fall to 14in. at the other. A ¼in. gap was left between tiles to allow the water to escape. The gaps between the pipes were covered with strips of tarred roofing material to prevent the entry of soil, after which the pipelines were buried and the soil surface again levelled.

At each end of the glasshouse two concrete reservoirs were constructed. It was necessary to deepen the concrete foundations at the ends of the house more than usual to provide for the inner concrete walls of the reservoirs. The bottoms of the reservoirs were also concreted.

The specifications of the reservoirs shown in the diagram are not the same as those built in the glasshouse being described. At the time of building the grower had to use what materials were available and the reservoirs which he built varied in size. Though considerably narrower than those of the reservoirs built, the specifications given are considered adequate to operate the system satisfactorily. When installed the tops of the reservoirs were slightly above the ground, and the whole of the pipeline system was connected to the reservoirs.

Some doubt exists about the necessity for having reservoirs at each end of the glasshouse. The system may operate satisfactorily with reservoirs at only one end of the glasshouse, with the pipeline system sealed at the other end. Whether results would be satisfactory with such a system is not known, but it is considered worth a trial. The system as operated in the glasshouse described has given even and successful distribution of water to the several crops grown since its installation.

As a clay type of subsoil retentive of moisture is one of the essentials for the successful operation of the sub-irrigation system, the fall of 2in. to the second reservoir has the advantage of providing very free drainage should excessive water be supplied to the crop, and probably the pipelines would be less subject to clogging than in a system sealed at one end.

Cost of Materials

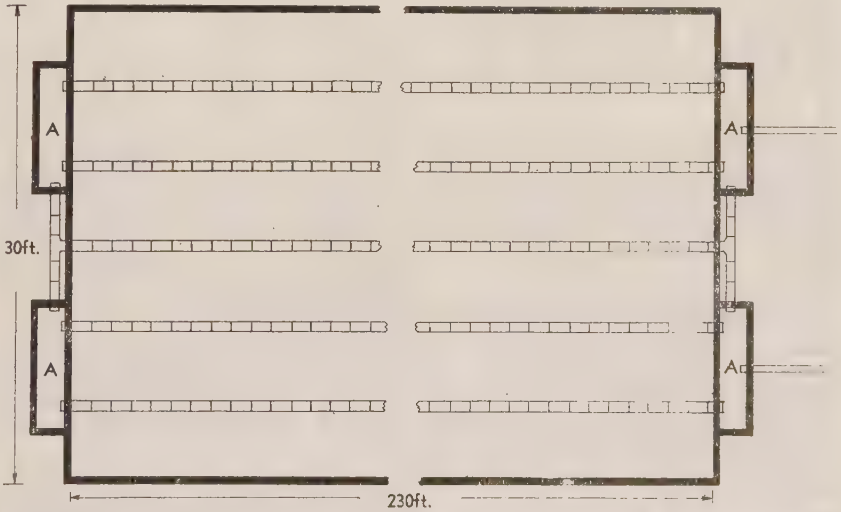
The following list gives the materials used and their approximate cost in constructing the sub-irrigation system described:—

	£	s.	d.
1100 3in. field tiles at £2 a hundred	22	0	0
Tarred roofing material and T tiles (estimated) ..	4	0	0
Installation of four concrete reservoirs	33	10	0
Total	59	10	0

Those costs were incurred when the system was installed in 1945-46, but for a true perspective of the over-all cost, labour and piping from the source of water must be included. The installation of the concrete reservoirs is the most costly item, but that cost would vary with the length of the glasshouse and the size of the reservoirs. The installation of reservoirs 8ft. x 2ft. x 2ft. would reduce the cost considerably.

Method of Watering

The water supply is connected to the two reservoirs where the pipelines enter at a depth of 12in. The water enters directly into the pipeline system, and the fall of about 1in. to



The pipeline system consists of five lines of 3in. field tile pipes 5ft. apart. It is connected with two reservoirs (A) at each end of the glasshouse, one pair of which is connected to the water supply. The reservoirs measure 8ft. x 2ft. x 2ft., with 4in. walls. At the supply end the pipelines are 12in. below the ground, with a fall of 2in. to the other reservoirs.

GLASSHOUSE SUB-IRRIGATION . . .

each 100ft. of pipe is said to give a uniform supply to the system. In the United States, where sub-irrigation is practised in districts where soil conditions are suitable, a fall of 1in. to each 100ft. is recommended and has given a satisfactory and uniform supply of water to crops.

Before being planted the soil surface may be moistened evenly by turning on the supply and allowing the water to rise until the surface of the soil shows an even distribution of moisture. That is done to create a suitable planting condition, but when the crop has been planted the water is not brought to the surface again during the life of the crop; it is controlled by turning on the supply and allowing the water to rise to about 4in. from the soil surface, after which it is turned off.

The weather will govern the frequency of watering and the dryness of the soil the quantity of water required. The amount necessary for one irrigation may be judged by testing the soil at various places in the glasshouse, and when moisture is apparent about 4in. below the surface the supply should be turned off.

Quantity of Water Used

In the glasshouse described, covering an area of 6900 square feet, the water necessary to irrigate the tomato crop has been carefully recorded. The house is planted out about mid-September and the crop harvested by the beginning of March. A crop of a different kind is planted in March and harvested by the end of August, and tomatoes are planted again in September.

To produce the tomato crop for the 1946-47 season 114,000 gallons of water were used; for the 1947-48 season the figure was 90,000 gallons. That variation is attributable mainly to the difference in the amounts of organic matter in the soil and partly to the weather. The estimated time taken by one man to water the 1946-47 crop was four hours and for the 1947-48 crop slightly longer than three hours.

Crop Yields

Crop yields for the 1946-47 season averaged 8¼lb. a plant and for 1947-48 7½lb. The crop was not sprayed in either season. Tomato leaf mould did not appear until late in the season and the infection was not sufficiently intense to cause a reduction in crop yield.

It is not claimed that sub-irrigation was responsible for the high average yields, as it is admitted that cultural practices, including applications of fertilisers and organic matter to the soil, contribute largely to the success of crop production. On the other hand, it is contended that sub-irrigation alleviates the severity of infection of tomato leaf mould.

Advantages and Disadvantages

From the limited experience gained the watering of glasshouse tomatoes by sub-irrigation shows the following advantages over the normal system of watering:—

1. Very little labour is required, the work consisting of little more than turning the water supply on and off according to the time taken for the water to rise to the required level.

2. The soil surface and air in the glasshouse are kept drier and fungus diseases, particularly tomato leaf mould (*Cladosporium fulvum*), are largely prevented, or at least the infection is retarded considerably.

3. Spraying for the control of fungus diseases is kept to a minimum.

4. **No crust forms on the surface of the soil and hoeing of the crops becomes almost unnecessary.**

5. Soluble fertilisers are not washed deep into the soil beyond the reach of the plants' roots.

The following disadvantages are known to affect the efficient working of the system:

1. An abundant water supply is necessary. If adequate water is not available, boring or the sinking of a well may be necessary—possibly a costly operation. No comparisons are available in New Zealand, but overseas experiments have shown that water consumption is often two or three times that for ordinary watering.

2. **The right type of subsoil is necessary for satisfactory sub-irrigation. A clay type that will hold the water reasonably well is desirable. Over-porous subsoils will allow the water to escape downward.**

3. The glasshouse foundations must be constructed to meet the requirements of sub-irrigation.

4. In some instances the field tile lines may interfere with the process of soil sterilisation, and also with the changing of the soil in the glasshouse if that is carried out.

Growers of glasshouse tomatoes who may contemplate using sub-irrigation are advised to consider the advantages and disadvantages carefully before adopting this method. At present only a limited knowledge of the results is available. Trial and error methods have been necessary, and further information is required before definite recommendations can be made.

The effects of over-watering are not immediately visible when using this method and, where the water supply is abundant, care should be exercised to ensure that the crop is not oversupplied with water. Injury to the plants from excessive irrigation is usually more serious and more difficult to overcome than from lack of water. Excessive irrigation causes the growth of the plants to be retarded; they become stunted and some will probably die. Furthermore, over-irrigated soil is likely to become sour, which is detrimental to future cropping.

Acknowledgment

Messrs. W. Copping and Son, Levin, supplied information which materially assisted in the preparation of this article.

Reference

A. P. Spencer—Bulletin 99, Agricultural Extension Service, Gainesville, Florida.

Country Girls' Clubs Form National Organisation

At a meeting convened by the Canterbury Council of the New Zealand Federation of Young Farmers' Clubs and held recently in Timaru, a movement that has been developing slowly for some years reached a new stage with the formation of the New Zealand Federation of Country Girls' Clubs, when the nine existing clubs were federated into a national organisation.

CHAIRMAN of the new organisation is Mrs. B. Jarman, who is president of her own club at Darfield (Canterbury), vice-chairman Mrs. W. Fletcher, senior advisory member of Willowbridge Club (Canterbury), and organising secretary-treasurer Miss R. Craven, of the Extension Division of the Department of Agriculture.

The movement, originally sponsored by the Y.F.C. Federation, is intended to serve New Zealand's rural young women and girls as the Young Farmers' Clubs are serving its rural young men and boys. The girls receive assistance from the older women of the community, who act as advisory members of the clubs, and from the Rural Sociologists of the Department of Agriculture, who help both by giving lectures and by putting the girls in touch with others who can serve them further in this way. Young Farmers' Clubs have also assisted and it is hoped that, as the movement grows, co-operation between the clubs in all districts will continue to be close.

Forming New Clubs

If in any district there are at least 8 girls or women, either in a country town or in the country itself, between the ages of 14 and 30, who would like to have a club of their own at which they may plan and carry out the things in which they are interested, they should get in touch with their local Young Farmers' Club secretary; with Miss R. Craven, secretary of the New Zealand Federation of Country Girls' Clubs, Extension Division, Department of Agriculture, P.O. Box 3004, Wellington; or with the Rural Sociologist, Department of Agriculture, Auckland, Wellington, Christchurch, or Dunedin (in each case except Wellington the address is Private Bag).

Now that the federation has been formed, it is hoped that the movement will grow, and that participation in inter-club as well as local activities will give rural young women the valuable experience of taking part in fuller community living, with all its advantages and opportunities.

Advantages Gained from Binning Wool

IN many cases binning is the best means of disposing of wool and a practice which, with profit, could be more widely adopted by farmers. Its main use is for dealing with a collection of fleeces and oddments which do not fit into the clip and which cannot be made into additional lines because of the small quantity of each. It is a practice which can be adopted, too, for handling clips where there is such diversity of types that little can be done by classing (unless the clips are of average size at least) or for disposing of that portion of fleece wool or oddments in all clips which cannot be included in the usual lines. In this article J. G. Ball, Sheep and Wool Instructor, Department of Agriculture, Wanganui, explains what happens when wool is binned and points out the advantages of binning.

IN essentially dairying districts many farmers run some ewes mainly to keep pastures in good order and to supplement the income from their herds. The ewes are probably bought in several consignments, but since the pastures on which the sheep will run on the dairy farm are usually of a better type than those on the larger sheep-farming holdings from which the ewes came, little attention is paid to type, providing the ewes are healthy, alert, and in lamb. Lambs from ewes carried on dairy farms are sent away fat off their mothers and ewes only are shorn before they, too, go off to the works. From these ewes there is generally not enough wool to make a "lot" (which must be of four bales or more) in the main catalogue of a wool sale and, moreover, the wool from such sheep will nearly always be very mixed—from fine soft wool to a harsh strong type. Having only a small mixed offering a farmer will be wise if he bins his wool. Buyers and manufacturers require what is known as "straight lines," not mixed clips.

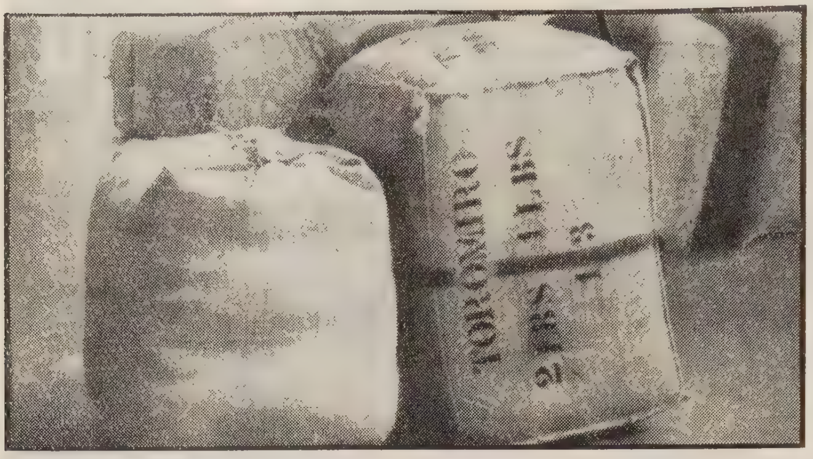
Binning Procedure

A farmer who decides to bin his wool will have to fill in an appropriate advice note to be forwarded to the broker with the wool. When the wool arrives at the store it is immediately weighed, the weight being branded on the bale and also recorded on a sheet which is sent to the main office. The producer receives the original copy of this receipt showing the net weight of wool received, for which he will be paid, and the tare or weight of the packs (9lb. for a New Zealand flax pack and 10lb. for an Indian jute pack). When it has been weighed the wool is stacked away with all other bin wool to be classed when required. From the place where it is stored it goes into the bin room, accompanied by its bin slip, so that the brand, name, weight, and tare can be checked before the pack is opened.

To accommodate the extremely wide variety of types of wool which they handle, all brokers' wool stores are provided with a large number of bins. Each line for binning is opened up and the wool taken out and classed in exactly the same way as the clip is classed in the shed. The main difference, of course, is that in binning wool perhaps 15 to 20 lines may be made. However, each bin line is weighed and the weights of each individual line are recorded on the bin sheet belonging to the clip. It should be noted here that the chairman of the New Zealand Wool Brokers' Association has given a direction to brokers that all bin wool must go "over the table"—an expression used in the wool trade which means that all wool, fleece and piece oddments, must be handled and classed individually.

The heading photograph shows the interior of a broker's store. Note the large number of bins to deal with a wide variety of wool.

ADVANTAGES GAINED FROM BINNING WOOL



Odd bales and part bales from a clip should always be binned.

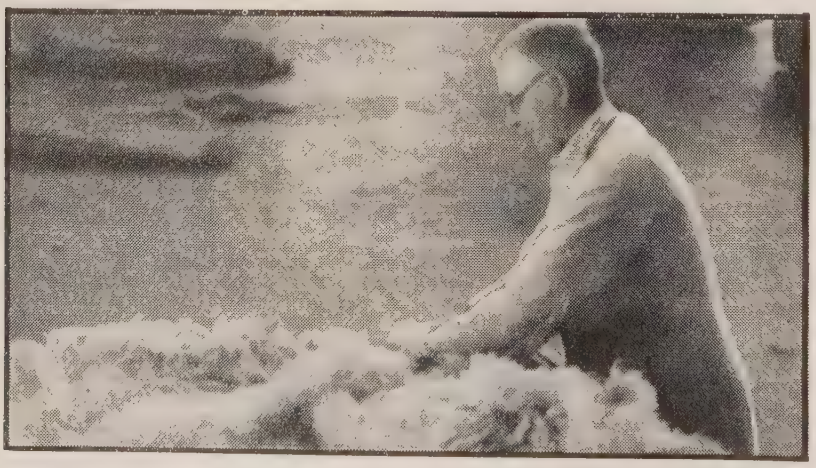
Skirting

After the wool has been weighed at the broker's store it is placed in a bin with wool of a similar type and quality. Not all fleece wool that is binned can be improved in value by skirting; heavy, seedy fleeces (carbonising wool) do not warrant skirting, but in nearly every case there will be some wool at least that will bring a higher price if it is skirted. Wool sent in for binning is skirted only when the grower gives instructions to that effect. Where skirting is done the clip will produce some pieces, which will vary in quality and will therefore go into different bins, but in each case the pieces, in common with all other wool, will go into bins containing wool of similar quality, type, and yield.

When a clip has been finally classed and all the wool cleared up, the bin sheet is balanced, as the weight of wool binned must correspond with the weight branded on the bale when it was first received into the store. Each bin is then baled separately, sewn, and branded, but with the brand of the broker handling the wool. The new brand is then recorded on the broker's books and eventually included in the bin catalogue for the sale. Of necessity the grower loses his identity, as his wool is now included in a bale with the wool of a number of other producers. As it would be impracticable to put the brands of all these owners on the bale, the broker's brand is the only one used.

A very important point is that wool buyers recognise the high standard of work done by brokers in the course of binning wool, since the brokers employ classers who are doing this work continually and are specialists. From the buyer's point of view this virtually guarantees the quality and standard of the wool, and it indicates why binned wools almost always bring a better price than wools of a similar type offered in the main catalogue.

When the binned wool is sold at auction the price of each bin lot is recorded and the grower is paid for his wool on a pro rata basis.



Skirting should be carried out where necessary before binning.

Other Cases Where Binning Pays

While binning is particularly suitable for the man with a small mixed offering, it is a practice which can be adopted by many wool growers. Sheep farmers with relatively-large clips, who employ wool classers to class their wool at the shearing shed, will often find that the classer has odd fleeces which do not fit into the various lines and which should be put into a bale branded "bin." Some fleeces may be too strong or too fine to match the other wool, and such fleeces should be binned. Again, the classer may have to deal with wool which, on the whole, is a very good or a very bad colour. In either case the classer will bin the wool which does not match.

Then, of course, there is the wool from the children's pets, and it seems usual to make a pet of any black sheep on the farm. Black wool must always be kept separate, because the manufacturers have great difficulty with what is known as black wool, as it does not take the dye in the same way as white wool.

[*Sparrow Industrial Pictures Ltd. photo.*

Binning facilities offered by the broker help out the shed classer with the odd fleece which does not match.

All hard or inferior cotts should be kept separate, and when there is not enough of this type of wool to make a lot it should be binned.

The important thing about binning is that, by using this method of disposal, the producer is paid for what he has grown. A farmer with several bales of wool each containing many different types may choose to sell in the main catalogue under his own name, but what price will he receive?

It is a sound practice for any wool producer—the man with a small offering or the sheep farmer whose main income depends on his wool cheque—to consult his broker as to the best method of disposal. The wool grower will find that it will pay to take the broker's advice.

Growing Culinary Mustard in Canterbury

By I. J. PURDON, Fields Instructor,
Department of Agriculture,
Christchurch.

BECAUSE priority was given to essential food crops in Great Britain during the war, the area of culinary mustard grown there was reduced considerably and the Dominions were called upon to supply the area of mustard needed. In the 1946-47 season 2500 acres were grown in New Zealand, 1500 acres in Canterbury; while in the 1947-48 season the figures were 1300 acres and 520 acres respectively.

MUSTARD belongs to the brassica family and has the characteristics of turnip, rape, and related species. Mustard as it is known in New Zealand is of two types: White mustard (*Sinapis alba*) and brown or black mustard (*Sinapis nigra*). Varieties such as Montana Short and English Tall are classified as white mustard. The brown varieties are mixed and no definite variety is known in New Zealand. For the purposes of this article references will be confined to white mustard and brown mustard.

Mustard is a quick-growing plant which in ideal conditions may germinate in less than four days and will mature in 110 to 120 days. At maturity it is 3ft. to 6ft. high, depending on the variety and the class of land on which it is grown. White mustard is taller than brown mustard and has a thicker stem which is hollow and slightly hairy. The pods are in a cluster near the top of the stem. The stem of brown mustard tends to be more solid than that of the white variety, shorter, and hairy. The seed pods are dispersed and not clustered to the same extent as on the white mustard. The flowers of both species are bright yellow and, at first glance, resemble those of wild turnip. The seeds of both varieties are hot to the taste, brown mustard perhaps being the hotter. It is interesting to note that neither brown nor white mustard will cross with any other species.

Soil Type

Mustard has been grown on a wide range of soil types in Canterbury and produces yields as good as the fertility of the soil will allow. The ideal soil, however, is a medium, free-working loam of high fertility. Because mustard tends to ripen unevenly, perhaps more than other crops, the area selected for the crop should be of uniform soil type. Like turnip and rape, mustard is susceptible to aphis attack and for that reason it may grow better in areas round the foothills where the climate is colder.

In Canterbury mustard is spring sown and may follow turnips, potatoes, or grass in the general rotation, but the ideal treatment for mustard would be to grow lupins (ploughed in as green manure), follow this with a brief fallow, and then prepare the area for sowing in mustard. Mustard is an excellent cover crop and though the spring sowing of pasture, especially under cover, is not recommended in most areas, excellent pastures have been established by using mustard as a cover crop with spring-sown pasture. However, as the taller-growing white mustard may smother the grasses and clovers, brown mustard may be more suitable for a cover crop. Brown mustard should not be sown in paddocks where there is a risk of infestation with fat-hen, as the loss in dressing may be very heavy. Where tall weeds are likely to be troublesome it is advisable to grow white mustard, particularly in view of the fact that the crop will be harvested with the binder.

[*Green and Hahn Ltd. photo.*

Culinary mustard in the stook. Stooking should be done the day the crop is cut, as the stubble may be troublesome when it becomes hard.

Cultivation

The ideal seed-bed is one that is firm and fine, but not powdery. To achieve this ploughing should be early, to allow adequate weathering of the soil, and should be followed by a winter fallow before ploughing again in the early spring. Subsequent grubbing, harrowing, and rolling should assist in producing the seed-bed required.

If heavy rain occurs after sowing, it is advisable to give the paddock a couple of strokes with light harrows. It is not usual to harrow after the seed has germinated to eliminate weeds, as the young mustard plants may be damaged, and usually the quick-growing mustard will outstrip the weeds.

Sowing of Seed

Mustard should be sown in late September or October so that the crop matures in January or February, when advantage may be taken of the long, fine days. Sowings in November and December, even though the conditions may be good, can result in difficulties at harvesting if the weather is unfavourable. Generally, very early sowing is not advisable because soil conditions at this time often do not give good germination. The cultivation programme should be well planned so that sowings commence in September or October.

From 6 to 8lb. of seed per acre is sown, either through a turnip box or mixed with the superphosphate in a manure box. Though superphosphate is commonly used without harmful results, germination injury is likely to occur, and the use of reverted superphosphate is preferable. The rate of manuring varies from 1cwt. to 1½cwt. per acre, but a heavier dressing will not give a comparatively higher yield.

GROWING CULINARY MUSTARD . . .

Where seed is mixed with superphosphate this should be done immediately before drilling and the seed and manure should not be mixed and left to stand, as the superphosphate may affect germination appreciably. The seed should be drilled ½in. to 1in. deep in rows 7in. apart.

Harvesting

Sowing should be regulated to make harvesting in January or February possible. In these months the weather is hot, there are no dews, the moisture content of the seed is lower, and there is less likelihood of heating. If seed is harvested later, the risk associated with the factors already mentioned will be increased, and bird damage may be heavy because food will be getting scarce.

Reaper and Binder

Like all brassicas, mustard is difficult to harvest. It shakes readily and quickly, and in Canterbury, where high winds often prevail at harvest time, the harvesting of the crop should be done with the reaper and binder. This is definitely the best method of harvesting and should always be aimed at. Mustard should be cut when the seed is showing the first signs of colour change—from green to either brown or white. Reaping in the cool of early morning or evening may be an advantage, as there is less likelihood of loss through shaking. The crop should be left from 10 to 14 days to mature, and a moisture test should then be obtained to determine suitability for threshing. A simple test, however, is to bite the seed and if it is hard the crop is usually ready to thresh. It is not necessary to stook white mustard, as the stubble is strong enough to hold the sheaf off the ground, but brown mustard must be stooked because of its weaker stubble. Stooking should be done the day the crop is cut, as the stubble may be troublesome when it becomes hard. To prevent loss that may occur during cutting it is advisable to fix a sack beneath the packers and under the carrier, and to lift the sheaves from the carrier instead of tripping and allowing them to fall to the ground. The amount of seed saved by these means will more than repay the cost of labour involved.

Header Harvester.

If through mischance the crop has passed the binder-ripe stage, there is no alternative but to direct head. The importance of cutting at the right stage cannot be emphasised too strongly and farmers should watch crops closely.

With brown mustard direct heading should be carried out when the crop is fawn and has no sap in the straw. The seed should be brownish and hard to bite. For direct heading the white mustard crop should be amber and have no sap in the straw. The seed should be yellow and hard to bite.

The time for direct heading is important because heating is bound to result if the crop is headed too soon.

As a general practice windrowing is not recommended, as the crop may be lost through high winds. However, when the crop has been left for direct heading and there are tall weeds present which may spoil a direct-headed sample and perhaps cause heating, windrowing of the crop will allow the heavier weed seeds to fall to the bottom and the green material to dry off. Threshing may be started one to two days after windrowing.

The crop should be handled carefully after it has been bagged. It is best to half fill the bags and allow them to stand in the paddock for a few days. If weather conditions are unfavourable, the crop may be stored inside, preferably over the gratings of the wool shed, but not stacked one sack upon another. Any seed that is defective has a distinctive smell.

The moisture content of mustard must be lower than 12 per cent. or heating may result.

Too much emphasis cannot be placed on condition. If the crop is threshed at the right time and the simple rules set out in this article are observed, the danger of heating will be greatly minimised.

Yields

Yields as high as 10cwt. of dressed seed an acre have been obtained, but the average yield is about 4 to 5cwt. There is no apparent difference in yield between brown and white mustard, provided both are cut and threshed at the right stage. However, heavy dressing losses in headed samples of brown mustard have been experienced through the prevalence of fathen.

Much experience has yet to be gained of the cultivation of mustard in New Zealand, and general indications are that with more knowledge and better handling yields can be greatly increased. As with all brassicas, it is difficult to know when mustard is ready for cutting or heading, and "hit or miss" methods that may be adopted and succeed with other crops cannot be applied to mustard.

Provided that sufficient contracts for growing it can be obtained, mustard may rapidly become a popular spring-sown crop in New Zealand.

Mobile Crane for Lifting Concrete Posts

CONCRETE posts are strong, nearly permanent, and when properly placed in position attractive and neat in appearance, but they are heavy and awkward to handle. A mid-Canterbury farmer attached to his tractor a simple crane which enabled him to handle the posts with ease and to make adjustments in position with little trouble.

Two 4in. x 3in. rails 12ft. long were attached to the rear of the tractor on either side, bolted together at the top, and stayed to the front of the machine with a length of chain. A cross-piece of flat iron between the rails gave added strength and rigidity. A self-locking block and tackle was found to be an advantage, and one of the endless-chain type made the work easier. Two iron brackets were bolted to the top of the post for attaching the lift, and by manoeuvring the tractor the post could be placed where it was required. Any slight adjustment could be made while the post was suspended.

Though made principally for lifting posts, the crane can also be used for other heavy lifts around the farm. It is easily dismantled when not required.

—*R. INCH, Fields Instructor,*
Department of Agriculture,
Ashburton.

Pig Broadcasts

UNDER the auspices of District Pig Councils broadcasts will be delivered in December as under:—

Auckland—1YA, on December 28, at 12.35 p.m., "The Year's Work in Retrospect: "What have we Learnt?" by C. W. Wallace, Supervisor, Waikato District Pig Council.

Napier—2YZ, on December 10, at 7.15 p.m., "Seasonal Topics," by H. Hopkins, Supervisor, Tairawhiti District Pig Council.

Palmerston North—2ZA, on December 17, at 7 p.m., "How the Pig Council can Help You," by L. L. Marsdon, Supervisor, Wellington District Pig Council.

Internal Parasites which Infest Poultry

FOWLS are afflicted with two main types of parasitic worm, the large roundworm *(Ascaris gallinarum)* and a few species of tapeworms. By far the commoner, and therefore the more important economically, are the roundworms. In this article A. C. Howse, Poultry Veterinary Officer, Department of Agriculture, Wellington, describes these parasites and their effects, and suggests methods of preventing and curing infestations.

ROUNDWORMS infest the first half of the small intestine in the part which follows the gizzard and looped portion or duodenum as the gut is traced downward. From 12 to 20 or more are often found in one bird. Such infestations result in body wasting and emaciation, and frequently cause death because of stoppage of the intestine through impaction by the mass of worms present. In other cases birds are backward and do not come into lay.

Life Cycle of Roundworms

The adult worms, male and female, of which the latter is considerably the larger, live and breed in the small intestine, where the female lays large numbers of eggs, which are passed out with the droppings. These eggs are invisible to the naked eye, but can be seen quite clearly with a microscope. If swallowed by a susceptible bird immediately after being passed, they will not infect, but will be digested and assimilated like any food. Before becoming infective they require an interval in which to develop, varying, according to conditions of warmth and moisture, from 10 to 16 days. At the end of this period a young worm will have developed within the egg, and if the egg is then swallowed, the envelope is digested, releasing the young worm. It will grow to maturity in the intestine, where it will take part in the production of more worm eggs, thus continuing the cycle.

Though the adult parasites are most commonly found in the situation described, individual worms may occasionally wander to other locations. That is rare, but there have been instances of a roundworm descending from the small to the large intestine, and gaining access from there to the oviduct, where it has become incorporated in the albumen of a partly-formed egg.

Hygienic Measures

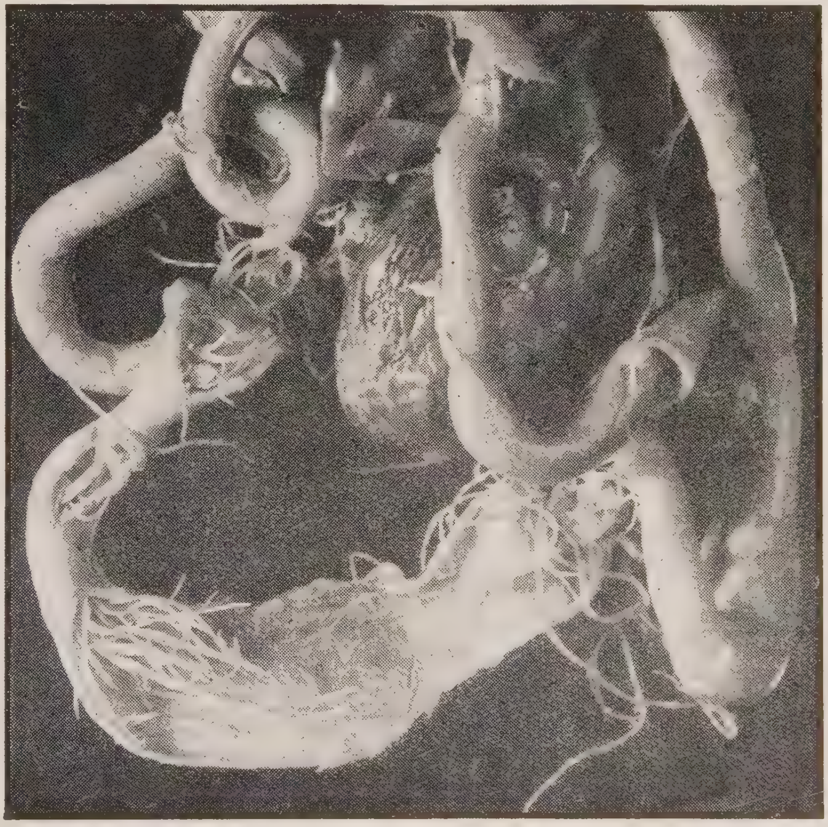
As each adult female worm lays many hundreds of eggs, the infestation is built up rapidly, particularly where large numbers of birds are kept in crowded conditions. The more crowded they are, the greater the quantity of droppings that will lie on the floor, and therefore, if any roundworms are present in the first instance, the higher will be the concentration of worm eggs and the greater and more rapid the infestation that will be built up. Any steps which can be taken to reduce the amount of poultry manure lying in runs and on the floors of poultry houses are all to the good. Overcrowding should be avoided, and at least 4 sq. ft. of floor space per bird allowed in intensive houses.

In addition, droppings pits or droppings boards should be installed beneath the perches and cleaned regularly. Removal from their reach of droppings passed by birds while roosting at night reduces substantially the amount which otherwise would collect on the floor, and lowers the rate of spread not only of worm infestation, but also of the many other diseases which infect through the droppings, such as coccidiosis, tuberculosis, and pullorum.

Dosing for Roundworms

In addition to this control by hygiene, medicine can be employed. The most effective drug for the expulsion of roundworms is carbon tetrachloride, which can be given in doses of ¾ c.c. per lb. of body weight up to a maximum of 2 c.c. per bird. If only a small flock is being dealt with, buying the drug made up in capsules may be preferable, but with large flocks the purchase of a drenching gun is probably cheaper in the long run. All birds in an infested flock should be dosed, and thereafter the young stock can be treated each year at the age of 4 or 5 months before being put into the laying houses.

Though carbon tetrachloride expels the worms, it does not necessarily kill them or their eggs and therefore, after having been dosed, birds should be confined on bare boards or a concrete floor without litter so that all expelled worms may be collected and destroyed. Alternatively, the birds can be dosed in the late afternoon, and the worms will be expelled during the night while the birds are roosting; the worms can then be collected from beneath the perches early the following morning. If droppings boards are fitted, the worms can be removed from the boards, which should then be scraped clean. If there are neither boards nor pits, the litter should be raked from beneath the perches before the birds go to roost, leaving a bare floor surface from which the worms can be collected.



The intestine of a fowl cut open to show a heavy infestation of roundworms.

It is important to remove the worms early the following morning before the birds have a chance to get at them. If the worms are left on the floors of houses or runs, the birds will soon become reinfested, so that the last condition may be worse than the first.

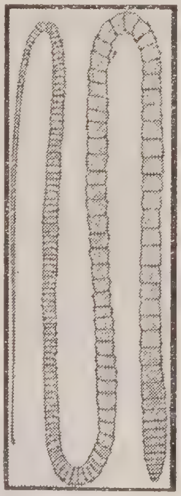
Tapeworm Infestation

Though less common in poultry than roundworms, when they are present tapeworms are likely to present more of a problem because of the unfortunate fact that as yet no effective medicinal remedy for poultry tapeworms is known. Different varieties of these parasites occur in many species of animals, notably in dogs, and also in man, but it is generally possible to expel tapeworms from their intestines by means of a suitable drug. However, drugs effective against such worms in fowls have not yet been found.

The life cycle of tapeworms differs from that of roundworms. The adult is found in the same situation—in the first part of the small intestine—where it lives with the head buried in the intestinal mucous membrane, to which it is anchored by hooks and suckers. The head merely affords attachment and has no mouth, nor does the parasite feed through this part, food being absorbed through the surfaces of the segments.

The tapeworm is segmented throughout its length, the smallest segments growing one by one from the head, and increasing gradually in size down the length of the parasite to the largest and oldest segments at the other end. These mature segments fall off one by one and are passed to the exterior in the droppings. Each is then a complete individual with muscular tissue and sexual organs. They are hermaphrodites—that is, each has both male and female sexual organs.

Self-fertilisation occurs, but if the fertile eggs are swallowed by susceptible poultry, they will not infect, as the young tapeworm must first pass a stage of its existence within an intermediate host, which may be a slug, snail, beetle, or other small creature. If, after the development of this larval or immature tapeworm has reached a certain stage, the intermediate host which contains it is swallowed by a fowl, development will then proceed to completion within the fowl. A tapeworm scolex or head will form and attach itself to the intestinal mucous membrane, where it will proceed to bud off segments and grow into a complete tapeworm.



A fowl tapeworm.

Any worm medicine employed against this parasite must get rid of not only the segments forming the length of the tapeworm, but also the head, or fresh segments will grow from the head as before. Tapeworms usually can be expelled complete with head from other animals by suitable drugs, but with poultry such drugs succeed only in breaking off and expelling the terminal segments, leaving the head still attached to the internal of the intestine, where further segments are budded off and a complete parasite soon grows again.

Methods of Attack

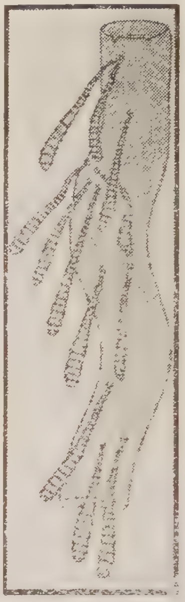
However, other means of attack suggest themselves when the life cycle of the organism is studied. If the cycle can be broken by destroying the intermediate hosts, fresh infestation can be prevented, and to that end runs can be sprayed with copper sulphate in a 1 per cent. water solution. The condition does not as a rule develop in birds kept intensively because of the absence of slugs and snails inside houses, and it may be desirable to confine birds in runs or on range to intensive houses for a period. Such treatment is not altogether satisfactory for several reasons, among which is the fact that existing infestations may take some time to die out, but it may be used as a preventive where extensive infestation already exists on a property, and at the same time outside runs can be treated with copper sulphate solution. Unfortunately conditions of free range, which in other respects are ideal for poultry, have the disadvantage that they predispose birds to tapeworm infestation because of the presence of natural food in the form of slugs, snails, and insects, which can act as carriers of these parasites in the intermediate stage.

However, there is no reason why most poultry keepers should worry unduly about tapeworm infestation, which fortunately is rather uncommon—much more so than the widespread roundworm menace. If a farmer has kept birds outside without ill effects for a long time, he should continue in the same way and certainly should not change his methods because of the slight risk of a tapeworm infestation which may never occur.

Keeping poultry on range or in runs has much to commend it and provides natural correctives in the form of exposure to sunshine and access to grass, soil, and natural insect food, going a long way toward remedying any errors in diet or management which might produce more serious effects under intensive methods.

Other Parasites

Roundworms and tapeworms are the two most serious types of internal parasites of poultry from the point of view of frequency of occurrence, and therefore of the greater economic loss which they cause. Other parasites include the gapeworm, found in the windpipe of young birds, where it causes breathing difficulty or "gapes," and the caecal worm, found in the caeca of adult fowls, and the egg of which is concerned in the life cycle of the organism causing blackhead in turkeys and occasionally in fowls. These are, however, comparatively rare, and the caecal worm certainly causes little trouble.



The intestine of a fowl turned wrong side out to show tapeworms attached to it.

Action to be Taken

If roundworm infestation is suspected, the following steps should be taken:—

A few typically-affected birds should be sent to the Wallaceville Animal Research Station, Private Bag, Wellington, with a letter giving full particulars of symptoms observed, numbers of birds kept of different ages, and details of flock management. If growing birds or laying pullets are backward and in poor condition, these circumstances should always be regarded as suspicious.

The owner may kill and open a few fowls and look for the worms in the first part of the intestine. If difficulty is experienced with this, the Poultry Instructor for the district will assist.

If infestation exists, the birds should be dosed individually with carbon tetrachloride, those of 5 months old receiving 1½ c.c. and adult fowls 2 c.c. per bird. These amounts should not be exceeded, and younger stock should not receive more than ¾ c.c. per lb. of body weight. Provision should be made for the collection of the expelled worms, which should never be left in runs or litter, where their eggs will soon reinfest the birds.

Similar symptoms will be encountered in heavy tapeworm infestation and again birds should be sent to Wallaceville. The owner should not rely on his own post-mortem examinations for the detection of tapeworms, which are small and inconspicuous and easily escape notice.

In cases of doubt where serious losses are experienced, the owner should communicate with the Poultry Veterinary Officer, P.O. Box 3004, Wellington, who will visit the property and give advice.

Control of Diseases and Pests by Spraying in Commercial Orchards

Early Jewel plum trees being sprayed with a "broom" supplied from a 500-gallon power outfit.

ORCHARD diseases and pests are controlled by the thorough application of spray specifics at correct strengths and at appropriate times. This article by A. H. Eddie, Orchard Instructor, Department of Agriculture, Motueka, emphasises the importance of complete coverage as a major factor in control, and indicates how such coverage may be obtained.

IN recent years both pump capacity and pressure of spray equipment have increased markedly. Ten gallons a minute for each nozzleman at a nozzle pressure of 500lb. to the square inch is the rule now, whereas a few years ago that was considered ample for two nozzlemen. There has also been a trend from single-nozzle rods and guns to the multiple-nozzled so-called "broom" or fog gun and the rod. Experience has shown that the trend has been in the right direction. Therefore, when such equipment is being selected, it is of paramount importance that the pump be of sufficient capacity and that the means for its operation—electric motor or petrol engine—be adequate.

For the choice of a handpiece, consisting of tap, barrel, and nozzles, collectively termed a fog gun, spray gun, or rod, it is necessary to have some knowledge of the principal features of each type.

Spray Guns

The main feature of a spray gun, the barrel of which is usually from 18 to 20in. long, is its mechanism enabling instant adjustment of the spray jet by the rotation of a handle at the hose end. This handle also operates the tap by which the jet may be shut off. Thus, theoretically, a spray cone variable to suit conditions within certain limits may be obtained instantly, giving maximum spread of cone radius with minimum penetration at one end of the scale and maximum penetration with minimum spread of cone at the other.

However, experience suggests that this equipment is usually operated in the latter position because the pressure of the liquid tends to force the mechanism to its widest opening, so that any intermediate position between fully closed and fully open can be maintained only by the operator resisting this torsion. Such resistance soon causes fatigue of wrist and fingers.

Another disadvantage of the spray gun is the comparative shortness of the barrel, which, especially when tall or wide trees are being sprayed, places the nozzle further from the tree extremities than it would be with a rod or, to some extent, a fog gun.

Fog Guns or "Brooms"

The fog gun or, as it is more commonly known, the "broom" may be obtained with varying lengths of barrel, but that of 3ft. is most used. Cross-heads may carry from three to ten nozzles. Principal features of the "broom" are its comparatively light weight and the facility with which the number of nozzles mounted on the cross-head may be varied. The nozzles are usually of the modified cyclone type. With a six-nozzled cross-head it is possible to have a three-, four-, or six-nozzle combination as desired.

The greatest advantage of this type of handpiece is gained when it is used with either the mobile or the crawler type of spray outfit. With the nozzlemen mounted on platforms above the ground, the disadvantage of its being shorter than the spray rod is much lessened if not eliminated. In addition, the ability of the cross-head to accommodate a variable number of nozzles enables the volume delivery to be controlled. Judicious use of this feature in relation to tree size ensures maximum coverage of the trees in the minimum of time in accordance with the forward speed of the outfit.

The handle at the hose end of the "broom" merely operates the tap by which the fluid flow may be shut off, and does not, as in the case of the spray gun, give any variation of the jets. This represents a possible disadvantage of this equipment in meeting variations of tree type and size. However, little time is required to reduce or increase the number of nozzles or to replace both whorl plates and discs to suit the conditions.

Spray Rods

A spray rod, the barrel of which is of ½in. bronze tubing, may be bought in a variety of lengths, but from 4ft. 6in. to 6ft. is the most useful size range. Lengths of less than 4ft. 6in. lose the advantage to be gained by carrying the nozzle close to higher parts of the tree, and lengths in excess of 6ft. are unwieldy. A Y piece is usually fitted, carrying two modified cyclone-type nozzles. The spray is controlled from the hose end of the rod by a "snap-shut," so called because when it is in any position other than fully open the fluid pressure, operating on a cone, snaps it closed.

The main sphere of usefulness of this type of handpiece is when it is used by nozzlemen operating from the ground, where advantage may be taken of the different lengths of rod available.

Whorl Plate and Disc Aperture

The whorl plate of a cyclone nozzle is a circular metal disc, ⅛in. thick, through which six holes have been bored. These holes, set at an angle of 45 degrees to the line of flow, impart a whorling motion to the fluid entering the whorl chamber. Increasing the angle of these holes gives greater cone radius of the spray jet; lessening the angle produces less cone radius but greater penetration.

Another factor affecting penetration is volume delivery—that is, the rate at which fluid is delivered from a nozzle. Therefore, decreasing or increasing the size of the disc aperture gives greater or less penetration.

Both these variations have limits, but a few experiments with whorl plates and disc apertures will quickly indicate to the grower the type of spray most suited to his requirements.

TOMOANA CALF PELLETS

THE UP-TO-THE MOMENT

CALF FOOD

J.7

CONSULT YOUR PRODUCE MERCHANT

Right from FURROW to HARVEST
ALLIS-CHALMERS

The Allis-Chalmers HD5 Diesel is a farmer's major ally in helping to produce extra output for Britain, without extra farm labour. Exceptional pulling power, smoothness of riding, tireless performance and safe grip on all types of soil, cuts operator fatigue, saves time, brings faster returns in crops and other produce. For lighter field operations the sturdy Model "B" is the ideal helper on small farms. For medium acreage, Allis-Chalmers Model "C" Row Crop is a highly dependable and economical aide.

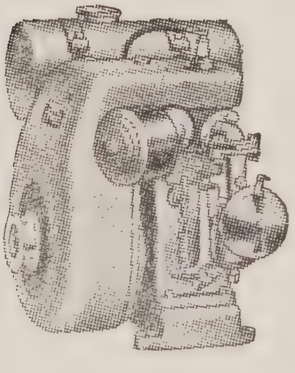
ALLIS-CHALMERS

North Island Distributors:
THE DOMINION MOTORS LTD.,
Wellington.
Dealers in all main centres.

Villiers

LIGHT-WEIGHT ENGINES FOR DEPENDABLE

Power



For reliability and efficiency buy VILLIERS, the light-weight engines with the big power output. With 50 years of technical experience behind them VILLIERS engines are known throughout the world for dependability and economy.

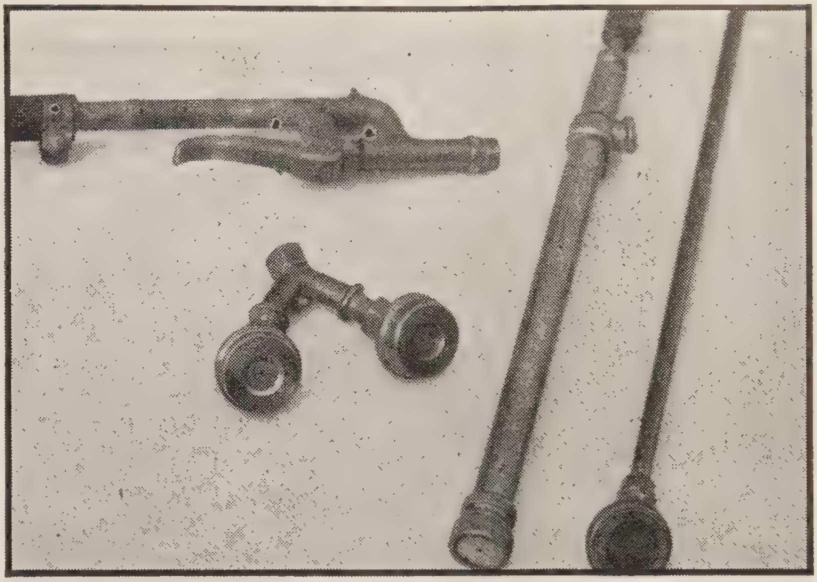
Obtainable in 1 h.p., 2 h.p. and 2½ h.p. Models.

Factory Representatives:
F. W. CAVE LIMITED
P.O. Box 1685 - AUCKLAND

V.E.4

K·P.
SUPER
44/46

KEMPTHORNE PROSSER & Co's
NEW ZEALAND DRUG COMPANY LIMITED
AUCKLAND — WANGANUI — CHRISTCHURCH — DUNEDIN



[*Green and Hahn Ltd. photo.*

Attachments for spraying apparatus. Upper left—Instant cut-off, lever type. Lower left—A Y head with two angled cyclone nozzles. Middle—A spray gun with twist-grip control and cut-off and single straight nozzle. Right—A rod with a single angled cyclone nozzle.

Choice of Nozzle

For average trees the nozzles used should give a compromise between cone radius and penetration. Maximum penetration of the spray is achieved by the commonly-known spray gun, with its narrow cone of comparatively-coarse spray droplets, but this type of nozzle has two disadvantages: The very narrow spray cone necessitates much greater accuracy on the part of the operator to secure adequate coverage, and the best coverage comes from fine droplets under high pressure. Maximum spread of cone with fine droplets was achieved by the original cyclone nozzle, but with the great disadvantage of lack of penetration.

In general, maximum penetration with comparatively-poor coverage is secured by coarse droplets under pressure, whereas maximum coverage with comparatively-poor penetration is achieved with a finely-divided, wide-angled spray, similar to that produced by the original cyclone nozzle. Therefore, it is necessary to obtain a medium between these extremes, which is supplied by modified cyclone-type nozzles. By mounting two or more such nozzles on one handpiece the spray cone may be widened as desired.

Condition of Trees

Tree density——that is, the number of leaders, fruiting arms, and laterals—has a considerable bearing on the extent to which disease can be controlled. Trees may be so dense and branches so jumbled that with the best of equipment and conditions it will be impossible to attain the complete coverage with the spray specific which alone will ensure good control of disease.

If branches are so crowded that foliage appears as an almost impenetrable wall, obviously coverage will not be achieved until the trees are opened up by the judicious elimination of surplus growth and leaders at pruning time.

It is equally futile to attempt to spray trees 20ft. high with a rod 4ft. 6in. long, fitted with a nozzle or nozzles of which the maximum penetration is 6ft. Even if the operator is 6ft. tall, the total range is only 16ft. 6in., or 3ft. 6in. short of the objective. A 6ft. rod carrying nozzles modified to give at least 12ft. of penetration would be suitable.

Nor is it profitable or sensible to use a narrow-coned spray gun with 20ft. of drive on young trees not more than 6ft. in diameter and 10ft. high. A dual-nozzled fog gun would be most effective.

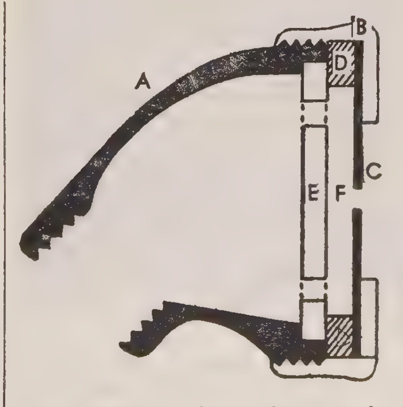
Planning to Suit the Conditions

The orchardist can exercise no control over the weather, but he should work out and employ the best possible plan to meet the conditions. For instance, in districts where midday winds are troublesome at some periods, if there is little or no overnight dew, spraying may be started very early in the morning and continued until possibly 10 or 11 a.m. Attempting to spray in even moderately-windy conditions is unwise; apart from the waste of time and materials, coverage of the points of the tree furthest from the nozzle is almost impossible.

After a shower or heavy dew it is essential that trees be thoroughly dry before being sprayed, and it is important that no spraying be done under conditions which do not permit quick drying of the spray, particularly if it includes lime sulphur or Bordeaux. Should rain fall on sprayed trees before they are thoroughly dry, the spray must be reapplied at the earliest favourable opportunity.

If noon temperatures are very high, spraying at the hottest periods is unwise, as serious scalding of the fruit and foliage may be caused.

Growers who maintain a strict time schedule throughout the spraying season may rest assured that if the previous spray was efficiently applied, no harm will result from a delay of a day or two beyond the schedule.



A cross-section of a cyclone nozzle. A—Nozzle body. B—Nozzle cap. C—Disc. D—Rubber washer. E—Whorl plate. F—Whorl chamber.

Within the limits imposed by the weather it is imperative that certified materials be applied at correct strengths—more particularly with pre-blossom sprays—and as nearly as possible at the exact stage of bud development recommended. Further information on this phase is contained in Department of Agriculture bulletin No. 161, "Control of Orchard Diseases and Pests by Spraying," and Orchard Instructors will give advice about local modification which may be necessary in the general spray programmes.

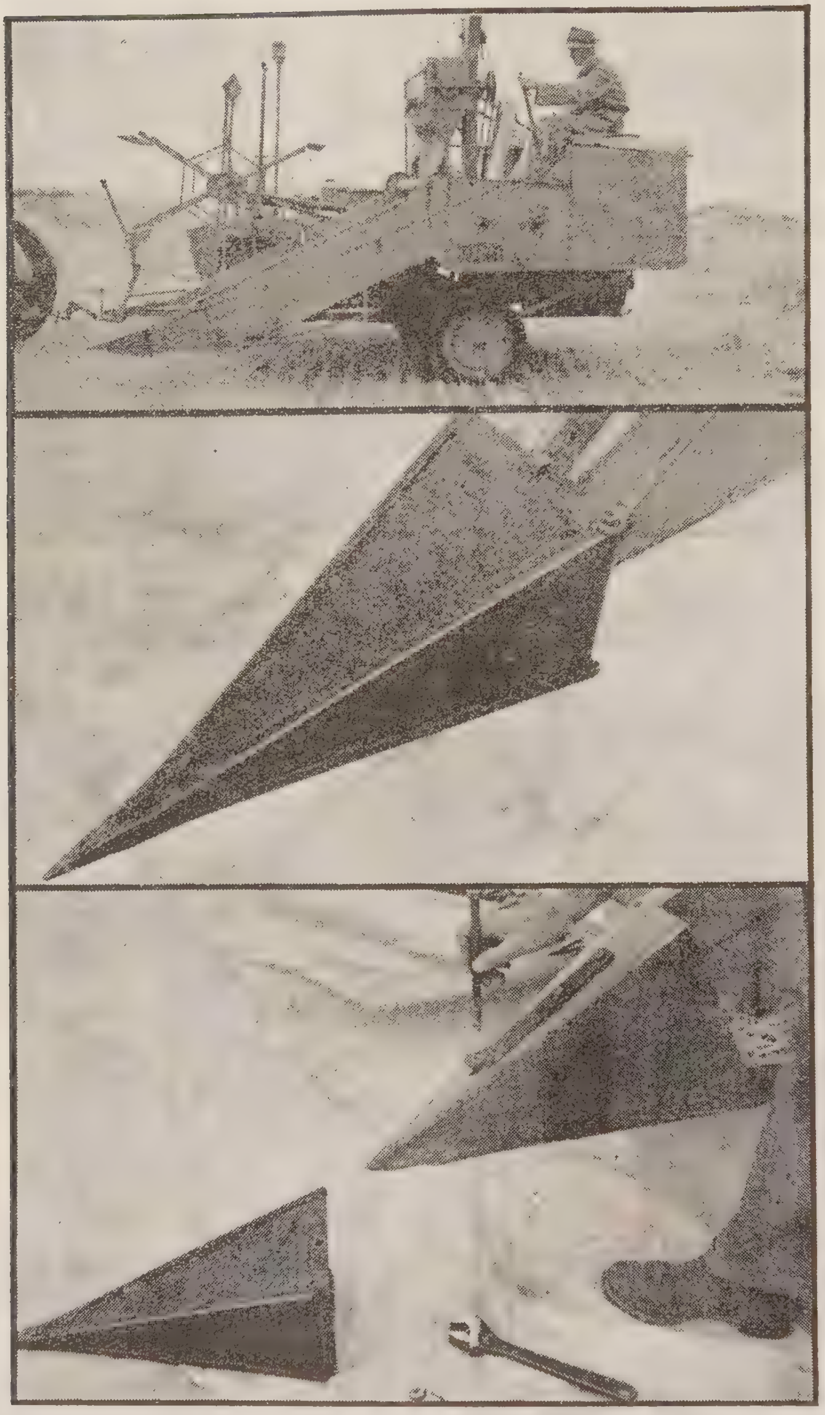
Completeness of Coverage

Where a grower has an increasing proportion of diseased fruit it is frequently found that there is a tendency to suspect the quality of the material used or the adequacy of the recommended strength, but failure of a spray to have full effect is usually attributable to incomplete coverage.

Each nozzleman must be fully aware of the importance of doing a thorough job. Without the will to do the work efficiently any or all precautions may be negatived.

As the many spray combinations now in use are intended to control or prevent damage by a diversity of insects and fungi, which singly or in concert may attack all parts of the tree and fruit, every leaf, twig, fruit, and branch from the outward and upward extremities down to the fork must be encased in an almost-invisible film of protective chemicals. Completeness of cover is essential for a clean, high-quality crop.

THE ELIMINATION OF BORDER



Upper—The header harvester, showing the movable point attached to the divider point. A rod connects the movable point to a lever by which the operator can move the point either right or left horizontally. Middle—The movable point, which is constructed of welded steel or iron and is hollow to enable it to be fitted over the divider point. Lower—Fixing the movable point to the header. The bolt acts as a swivel on which the point can be moved.

By K. COTTIER, Instructor in Agriculture, Department of Agriculture, Wellington.

TO enable the border rows to be eliminated from the annual wheat trials conducted by the Extension Division, a movable divider was fitted to the header harvester used to harvest the yields from the trial plots in the 1947-48 season. This article explains why the yield from the border rows had to be discarded and how the movable divider was used to do it.

THE wheat trials sown each year by the Extension Division aim at examining the performances of new lines and varieties and the effects of fertilisers under a wide range of conditions. They are designed so that accurate yield comparisons can be made, and every care is taken to obtain accurate results. A typical trial consists of a number of plots each of which is 2 chains long and usually seven rows wide. There may be as many as 50 plots, all sown parallel in one block; each plot is separated from its neighbour by a space of 14in. so that they are clearly defined.

In these plots there is a source of experimental error known as "border effect." This is caused by the outside rows of each plot, which, having more space, light, and generally more favourable growing conditions, tend to grow more vigorously than the other rows between them, and are therefore not representative of the plot as a whole. In comparatively-long, narrow strips such as the plots sown in the trials they may raise yields to an undesirable extent, but if the border rows are removed and only the inner rows harvested, the yields obtained are comparable with those of wheat crops grown under normal crop conditions. In seven-row plots it is therefore necessary to discard the border row on each side, basing yields only on the inner five rows.

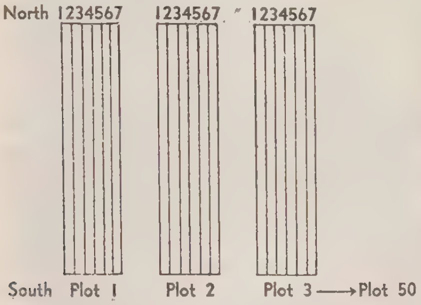
The extent to which border effect may affect yields is shown in the following table, which gives the results of a trial harvested in the 1946-47 season.

Variety	Yield in bushels per acre		
	5 centre coulters	2 outside coulters	All 7 coulters
A	45.3	59.6	49.4
B	55.6	72.1	60.3
C	55.5	77.9	62.0
D	54.5	71.2	59.3
E	52.8	73.2	58.6
F	45.6	62.0	50.3
G	39.4	59.5	45.2
H	42.9	57.5	47.1

This trial was not header-harvested, but yields were obtained by a method

ROWS IN CEREAL TRIAL PLOTS

of sampling. Yields from the two outside coulters and from the inner five coulters were obtained separately.



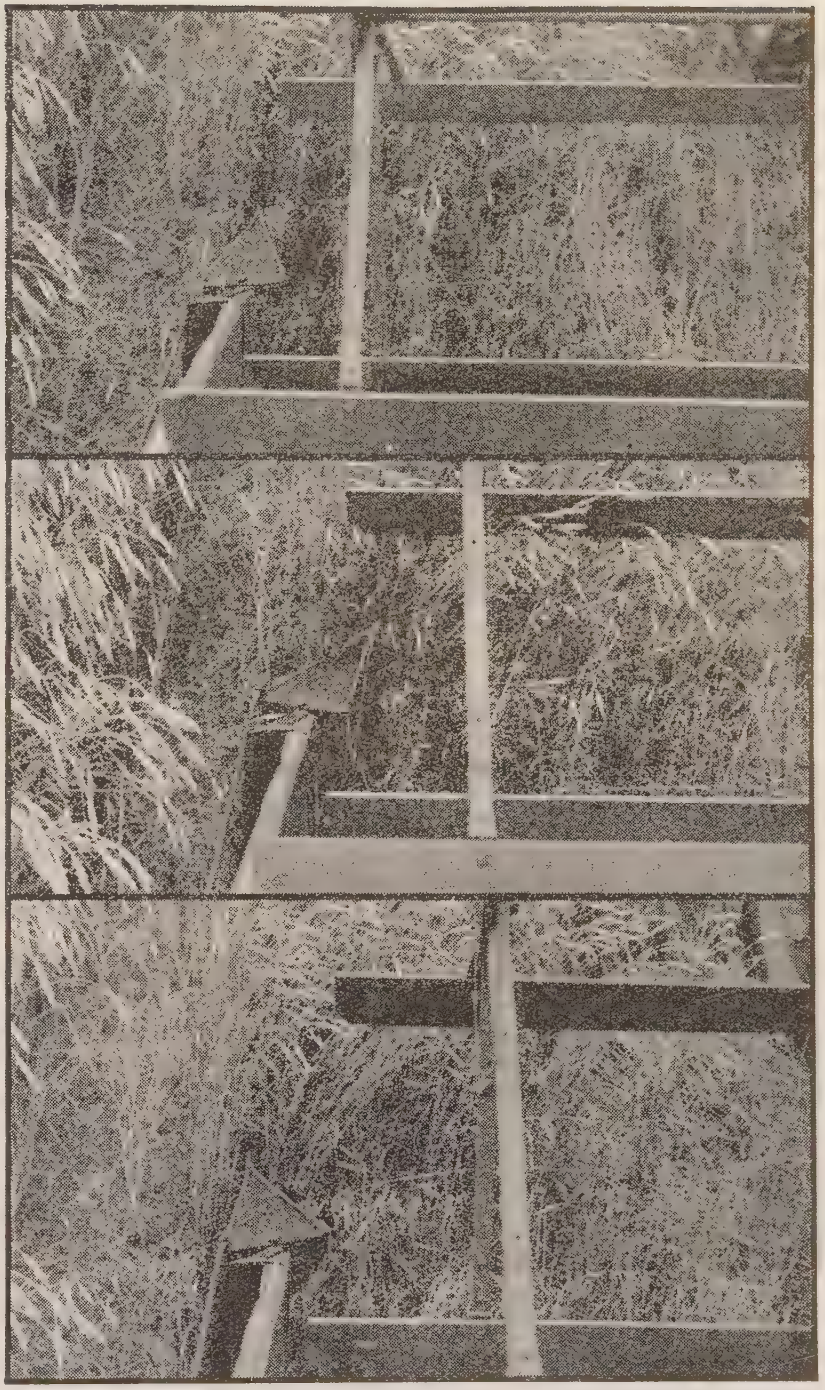
The elimination of border effect necessitated the harvesting of the outside rows separately—that is, in all plots rows 1 and 7 had to be harvested separately from rows 2 to 6, inclusive (see diagram above). All varieties sown in a single trial are of about the same maturity, and thus all the plots can be harvested at the same date.

Commencing at the north end of plot 1, the header in a single run harvested row 1 separately. The grain from this was collected in a sack, which was then taken off the hooks and replaced by another. The header, having returned to the north end, harvested rows 2 to 6, inclusive, in a single run. The grain obtained from these five rows was removed and weighed. Of plot 1 only row 7 remained. However, this row, together with row 1 of plot 2, was harvested with another run of the header, and the grain was collected in the sack which had caught the grain from row 1 of plot 1. This sack was thereafter used for catching only discard-row grain.

Rows 2 to 6, inclusive, of plot 2 were then harvested in the same way as the five centre rows of plot 1, and the grain weighed. Row 7 of plot 2, together with row 1 of plot 3, was then harvested. In this fashion the plots were harvested alternately in rows of two and five until all plots had been harvested.

In practice it was found extremely difficult to drive the header sufficiently accurately with ordinary equipment. Even slight deviations in the driving of the tractor meant that the divider of the header, rigid as it was, wandered off course between the rows, resulting in either a portion of a desired row being missed or a portion of a wrong row being cut in error. To obviate this error it was decided to fix a flexible point on to the header and to move it to the right or left according to slight deviations which the header might make, thereby maintaining the correct division between rows. A movable point was designed and fitted, and was able to be manipulated in such a way that complete efficiency was attained.

The accompanying illustrations show how the movable point was fitted and how it operated.



Upper—The header just entering a plot. The right-hand outside row has already been removed. The point is entering in such a position that the left-hand outside row will not be cut with the five rows to the right of the divider. Middle—If the header is driven in error slightly too far to the left, the point is moved to the right to counteract the error and to ensure that the left-hand outside row is deflected to outside the divider to prevent its being cut together with the other five rows. Lower—The point is moved to the left if the header has been driven slightly too far to the right.

CARE OF LIVESTOCK DURING DECEMBER

Contributed by the Animal Research Division.

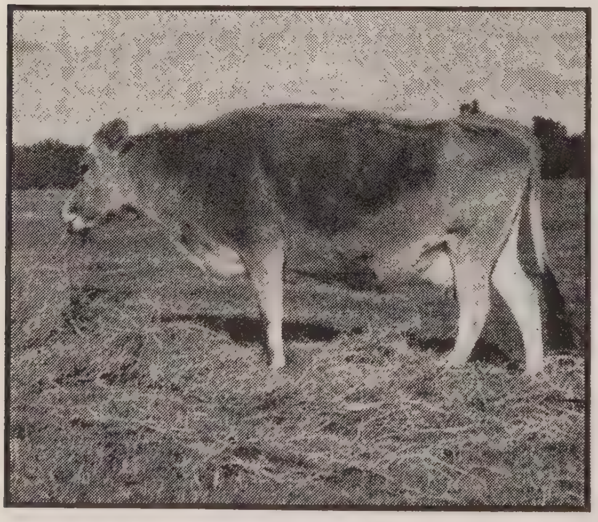
DRAFT OFF DRY EWES

As each lot of fat lambs is sold their mothers should be drafted off, together with any dry ewes which may remain in the flock. Any of these ewes which are to be culled should be shorn and fattened, but the remainder after shearing should be placed on short pasture with ample water with a view to reducing their condition. The removal of these ewes from the main flock will enable those which still have lambs to be given better treatment with the object of fattening the biggest possible percentage of lambs before weaning.

* * *

FOOT-ROT CAN BE ERADICATED

Many farmers consider that foot-rot causes more economic loss in terms of reduced production and labour costs than any other sheep disease. An article appearing on page 465 of this "Journal" tells how foot-rot can be eradicated from the flock. This is the season in which the eradication campaign must be planned.



DAIRY COW NUTRITION

The year's production can be materially affected by feed conditions during summer. Cows fed poorly now not only produce less milk during the summer, but will dry off earlier in the autumn. Dairy statistics show that long lactation is very important, so the feeding of silage or other supplementary milk-producing fodders should be started as soon as pasture commences to dry off and not delayed until milk production shows a material fall.

COWS RETURNING TO THE BULL

If cows are returning to service, mating records should be examined to see if any particular bull is to blame, and if this is so, arrangements should be made for a veterinarian or stock inspector to collect a semen sample for examination. Care should be exercised in purchasing replacement bulls. If possible, a young bull that has not been used previously should be bought. A bull should never be bought in the saleyard unless his full history is known. Washing out cows seldom helps and may cause trouble if irritant fluids such as kerosene are used. It often pays to consult a veterinarian as soon as the cows are noticed returning to service in unusual numbers. He cannot be expected to diagnose the trouble months later.

* * *

FOWL POX

So-called roup is often fowl pox, and specimens should be sent to the Animal Research Station, Wallaceville, for diagnosis. Outbreaks of this disease can be prevented by vaccination, full details of which may be obtained from the nearest Poultry Instructor.

* * *

SHEARING

Every effort should be made to reduce the time lambs are away from their mothers, as it is easy to dry ewes off at this time of the year. The ewes should therefore be brought to the shearing shed in small mobs and should be dagged before reaching the board.

* * *

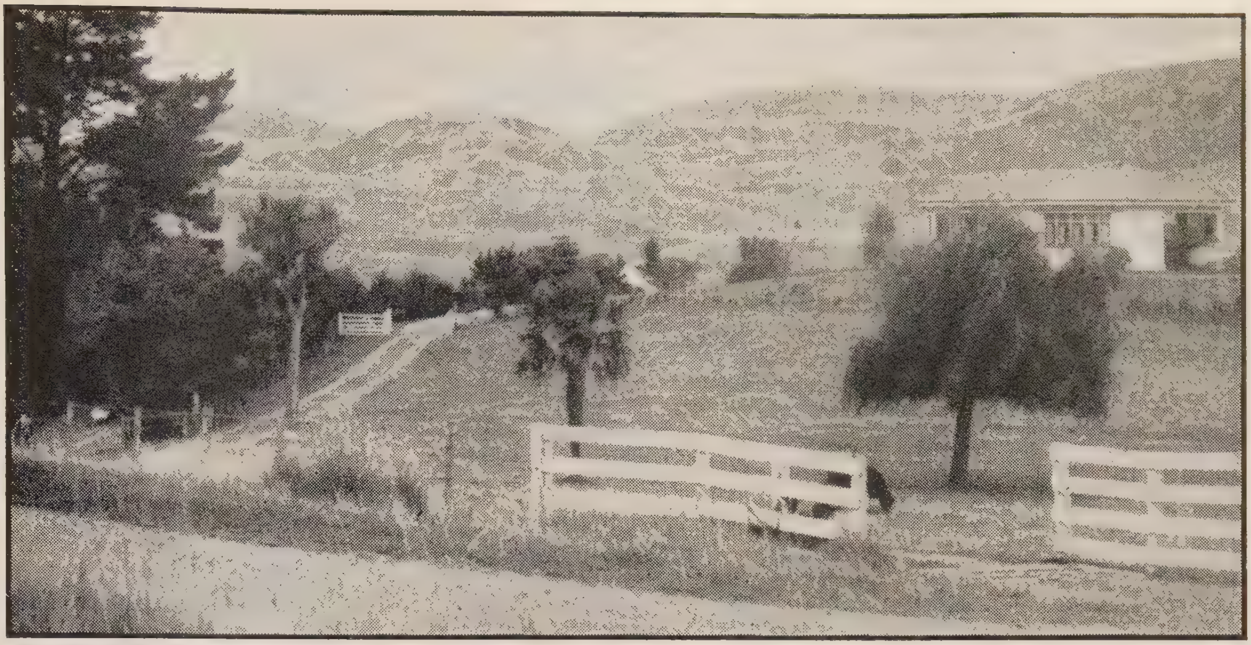
PIG FEEDING

Sows should be brought into the house a week or two before farrowing and fed up to 6 gallons of milk per day, but this should be reduced on the due date to 2 gallons plus bran if available. Watch for signs of constipation in heavy in-pig sows. Baconers from spring litters should be sold as sow feed requirements increase, as it is important not to starve the sows and litters. These sows require 6 gallons of milk plus an additional gallon for each pig in the litter. Meal may replace part of this ration at the rate of 1lb. of meal for every gallon of milk. Orders for next spring's meal supplies should now be placed with the merchants.

* * *

ZINC POISONING IN PIGS

The zinc lining of new galvanised pipes may be dissolved by dairy by-products flowing through them and these then prove poisonous when fed to pigs. The nearest veterinarian should be consulted before a new installation is made.



Trees and Hedges for the Approach to the Farm

IN the spacious early days of settlement in New Zealand the laying out of the homestead was often a leisurely matter, with labour and time available, and amenity was almost as important an aim as utility. From this outlook arose many of the beauty spots of the countryside, and from this work of the pioneers has been gathered much valuable information about the possibilities of tree and garden planting in various parts of the Dominion. This article by M. Sutherland, Farm Forestry Officer, Department of Agriculture, Wellington, offers suggestions about mistakes to avoid and ideas to develop in laying out the environs of the farm home. The second half will be published next month.

THE tendency in these days of stress and shortage on smaller or new farms is to make any planting, whether for utility or for appearance, purely subsidiary to the main business of husbandry, and under existing conditions such plantings must be reduced to a minimum. Gone are the days when the homestead was reached from a distant highway only after a prolonged drive along tree-lined avenues or through plantations placed to give both shelter and beauty. The modern farmer has less land to spare and must adapt to a smaller scale the methods used and the lessons learnt on a large scale by his predecessors.

Importance of the Approach

Though a well-planted farm driveway is not essential to the effective working of the farm, it is a valuable adjunct to the homestead and, by enhancing selling value, repays the trouble taken to give an attractive appearance and efficient trimness to the holding. Almost unconsciously a farm is judged by the factors of utility and appearance, such as good access, ample shelter, useful buildings, trim hedges, and an attractive home.

In this respect the approach to the house, whether it be by a tree-lined avenue or a flower-bordered pathway, is of great importance. However beautiful a home may be, the effect is distorted if it is approached through an open paddock in the teeth of a gale and along a muddy, ragged, or untidy roadway. An impression of comfort, prosperity, and efficiency is given when the route to the house leads through pleasant, sheltered ways on a good surface, shaded in summer from the glare and heat of the sun.

Position of Homestead Site

The kind of access adopted as approach to the farm depends primarily on the position of the homestead in relation to access from the main highway, on the general topography of the site, and on farming requirements. Where an initial planning of the whole farm and homestead is being considered, personal preferences as well as the demands of utility are certain to be brought to bear on the site of the house and route of access. For instance, some housewives prefer a house close to the public road so that they may feel in touch with affairs through the passing traffic; others like to be well away from the highway, and the home thus situated requires the provision of a driveway as access.

The choice of dwelling site must be governed largely by the work of the farm. A farmer running a milk round probably prefers to have his buildings and home close to the highway, and such an arrangement also simplifies the collection of cream by lorry or the dispatch of whole milk. The distance of home from highway is a consideration when young children must travel by school bus from their front gate.

Another decision which must be made in planning the farm layout is whether the access roadway—be it short or long—is to serve both dwelling and farmyard or whether separate access should be provided. A house approach which is used for the passage of stock is unsatisfactory in several ways: The surface is difficult to maintain against stock tramping in wet weather, mud is carried to the precincts of the house, and trees or shrubs planted in the vicinity are likely to be damaged by stock unless efficient protection is provided. Where possible, it is better to plan for one access road into the farmyard to carry stock, implements, and heavy cartage connecting easily with the farm track, and a second approach leading to the dwelling entrance, laid out and planted as desired without the danger of damage.

On not a few farms a well-planted homestead lies a short distance from the highway and is approached by a driveway running in a straight line from road to house. Such an approach gives an appearance of having been merely tacked on as an afterthought. To avoid this and give an attractive appearance to the farm, the most satisfactory procedure is to plan, in the early stages of development, a layout

LAYOUT OF APPROACHES . . .

for the whole homestead as an integral part of the planting system. By working always toward this end there is likely to be evolved a pleasing and well-proportioned ground plan in which the driveway is not merely a means to an end, but makes an important contribution to the general attractiveness of the home surroundings.

Types of Approach

Many kinds of arrangement for the layout of farm approaches are possible, ranging from the simplest open track to the wide and elaborately-planted driveway. Each of the following types has its merits and disadvantages according to the conditions under which it is used:—

Access directly from the highway: The simplest form of approach is a pathway from road to front door, or by entrance to the farmyard directly through a gate from the highway. This gives little scope for beautification except in the garden, but lends itself to improvement by the planting of shade trees in the vicinity.

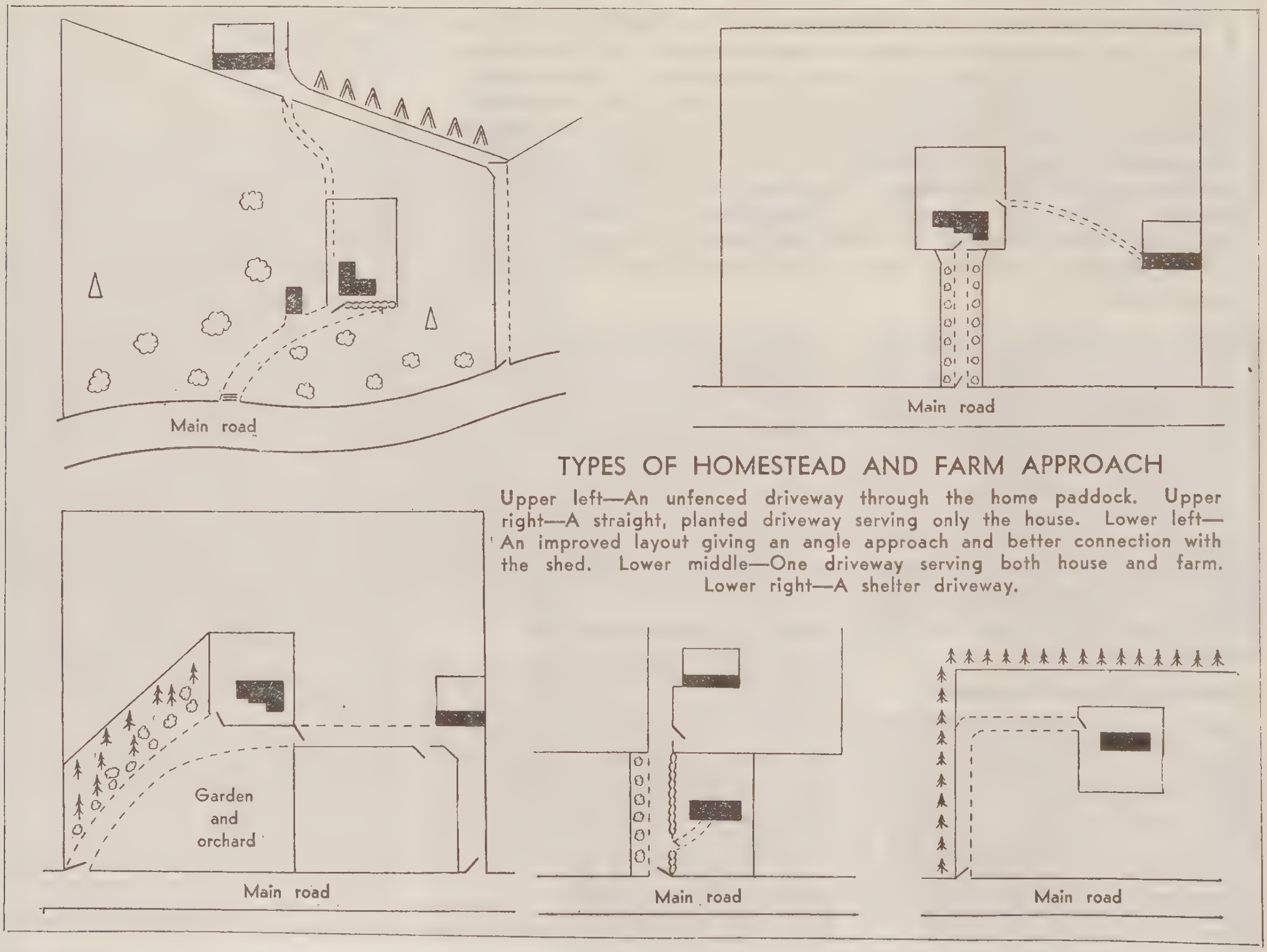
One roadway serving both dwelling and farm: This arrangement is not very satisfactory, but where it is necessary the disadvantages may be mitigated to a certain extent if the road is given a good surface and if sufficient land is devoted to access to allow of ample area being fenced off on one or both sides of the track, so that trees planted will not be endangered. If, as often occurs, the combined roadway runs along the garden boundary, past the house and toward the farm buildings to the rear, it is easy to plant some lining trees or bushes within the garden boundary, thus improving the appearance of the approach. Then, if desired, only the one width of ground need be reserved to be planted on the opposite side of the track.

Separate access to house and to farm centre: Access to a farm may be provided by a drive from the roadway to the home and by a second track leading by another route directly to the farmyard and buildings. In this arrangement it is possible to concentrate on making the home driveway attractive by well-placed shelter and amenity planting bordering the drive and in the vicinity of the house. Suitable treatment of the farm approach would necessitate rather the minimum use of planting compatible with the provision of adequate protection from cold winds or hot sun around the yards and buildings and their approaches. A layout can often be arranged so that the main shelter planting system provides protection for the farm roadway while local protection can be given by the provision of good marginal hedges.

Use of Unfenced Areas

Access tracks may be confined within fences or may simply lead through the paddocks to their destination. Such an unfenced approach is often seen where the house enclosure is fenced off from a paddock and enclosed by low or high hedges and where the line of access from the highway is over a well-worn, uneven, and often wet track made by the wheels of the farmer's car. This usually follows a straight line from road fence to house gate, with no attempt to beautify the approach or to relieve the landscape by the planting of trees or shrubs. The merits of such a simple approach are that it costs nothing, no land is used for access alone, and, if so desired, a clear and unimpeded view is left from house to roadway. But, though it calls for a minimum outlay on construction, such a mode of access may entail considerable trouble and upkeep because of the effects of winter rains, the extent depending on the nature of the soil.

With some trouble and a little expenditure the home precincts on such a farm can be changed, in suitable circumstances, to provide a pleasant introduction to the house, as has been done during the development of the



TYPES OF HOMESTEAD AND FARM APPROACH

Upper left—An unfenced driveway through the home paddock. Upper right—A straight, planted driveway serving only the house. Lower left—An improved layout giving an angle approach and better connection with the shed. Lower middle—One driveway serving both house and farm. Lower right—A shelter driveway.

The driveway winds across the home paddock beneath widespread shade trees to the house.

homestead illustrated above. In this case the home lay a few chains from a main highway, within a medium-sized paddock, and enclosed on three sides by a hedge and garden but open to sun and roadway on the north-west. The farmer started planting trees in the paddock between house and gate as soon as the house was built, and each year he put in as many trees as he could protect and tend; as the climate is dry, the young trees had to be watered during summer for the first five or six years of their lives. No trees were planted closer than 40ft., as the object was to produce trees that would develop a natural crown shape and give ample shade, and the species—in this instance mostly deciduous—were placed so that they would complement each other in shape, foliage, and colour. A cattle stop, flanked by a specimen tree on either side, was placed in the road fence, whence the approach wound in a wide curve under the trees to the gateway into the house section. As soon as it was planted, and for six to eight years after, each young tree was protected by three stout stakes with canvas stretched round them, and sheep were turned in to graze as usual in spring. Thus no land was lost for grazing, the sheep kept the grass down in the home precincts, and there was provided an attractive setting and approach to the house, which lost no sun but was sufficiently screened from the main road. Such a layout is suitable on a farm raising early lambs, where an early, sheltered paddock of sweet grass is especially useful.

In such a setting care must be taken in the selection of trees for planting, as a poorly-developed tree or a failure becomes a blot on the surroundings. Only species which are known to flourish in the locality should be chosen, and they should be those which form a spreading crown. Except for a few specimens of conifers, the trees should be deciduous, so that grass will persist on the ground round their trunks. Suitable trees for most parts of the Dominion would be English oak, pin and scarlet oaks, plane, sycamore, golden ash (where it will grow well), balsam and Chinese poplars, lime, and liriodendron (except in southern areas), with one or two Nordmann silver fir or *Cryptomeria japonica* to give variety of colour and outline.

Enclosed Areas

In planning a layout where the decision has been made to enclose land for access or amenity planting, many variations and arrangements of access driveways are possible. The farmer's aim will be to evolve a satisfactory plan which entails the minimum use of land for such non-productive purposes and requires the most sparing use of fencing.

The approach roadway required may be of only a few chains, or a long driveway may be called for, extending through more than one paddock; hedge growth only may be required, or the decision may be made to border the route on one or both margins with planted trees or shrubs. Each of these types of driveway can be made attractive in its own way—for example, by introducing a curve instead of a straight stretch of roadway, by skilful arrangement of trees and shrubs to fit into the lie of the land, or by the choice and orderly maintenance of good hedge species.

No two farms are alike in environs and approach, and it is in the layout and development of the homestead precincts that the welcome individualism found in rural areas can best be expressed and perpetuated. That is well illustrated by the variations in the kind of hedge adopted by farmers within one locality.

Hedge-lined Driveways

The most common types of hedge used to line an access driveway are trimmed hedges of *Cupressus macrocarpa, Pinus radiata, P. muricata,* and Lawson's cypress. The advantage of most of these is that some height is attained rapidly and that, with the exception of Lawson's cypress, they grow well in exposed situations, but grown as hedges such species entail much work in regular trimming.

Where a hedge is required to line a short length of approach driveway, a similar effect might be obtained by the use of such species as Chinese privet, seedless barberry, or pittosporum species such as *P. tenuifolium* and *P. eugenioides,* which do not require such constant cutting to keep their growth within bounds. Short lengths of driveway can also present an orderly appearance if the lining hedge is kept to fence height, and for this purpose suitable species are laurel, escallonia, *Abelia chinensis*, or *Tecoma capensis* in frostless districts.

Tree-lined Driveways

The planting up of a driveway of three or four chains requires more careful planning than a long stretch of roadway. A short avenue of trees leading to the house might be desired, but in that position tall-growing

A coastal farm driveway lined by a belt of low, native trees—*Pittosporum tenuifolium, Melicytus ramiflorus,* and some karaka.

SPEEDWAY STERILISER

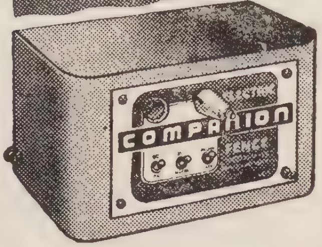
BURNS OIL OR WOOD

Write for free
illustrated catalogue to
SPEEDWAY PRODUCTS LTD.
26 Albert St., Auckland
South Island Distributor:
A. H. TURNBULL & CO. LTD.,
Chris'church

STEAM & BOILING WATER

SS-1-2

SAVES WIRE!



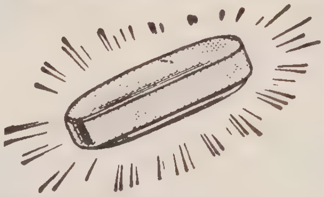
COMPANION

ELECTRIC FENCE

Quality Unit with a 1-YEAR GUARANTEE—use existing wire. RAIL or FREIGHT FREE. Write for Leaflet.

JOHNS LTD

JOHNS BLDG. Chancery St., Auckland. Box 471. Also at Pukekohe



DEMAND exceeds SUPPLY for 1947-48 of "PHENOVIS" Pellets for DRENCHING!

Pellet dosing eliminates staining during administration—is clean and accurate. "Phenovis" 5-gramme Phenothiazine pellets are made and tested by Imperial Chemical Industries Ltd.

Orders Invited NOW for next Season.

Next season's orders are already being filled. Send your preliminary enquiries to us and full particulars will be sent by return mail.
Full details of cost and administration from . . .

SUMMIT
PRODUCTS LTD.
Distributors,
P.O. Box 328, Palmerston North.

DAVID BROWN easily pulls a full 3-FURROW plough

Prices Reduced £70

Even under adverse conditions the English DAVID BROWN gives 3-FURROW performance with a gratifying economy in fuel.

See your dealer for details of England's finest tractor—the David Brown.
N.Z. Distributors
TODD BROS. LTD.
Todd Bldg., Courtenay Pl., Wgtn.
DEALERS EVERYWHERE.

Barnet-Glass *inflations*

A NAME TO BE NOTED FOR BETTER MILKING . . . TO THE LAST drop. Barnet Glass Inflations are Dunlop products, backed by sixty years of leadership in Rubber. Ask your Supplier for BARNET GLASS INFLATIONS!

● ANOTHER **DUNLOP** PRODUCT

BGM.6.

A farm approach along the sheltered side of a planted belt fenced off from the paddock.

trees would be unsuitable and dangerous, as for most of its length the driveway must be close to the house. As well as possibly depriving the homestead of much sunlight, in course of time the trees would tend to dwarf the dwelling and in heavy winds would be a menace. Tall trees lining a driveway also shade and darken the approach unnecessarily and prevent the entrance of sunshine to dry the road surface.

A simple and suitable treatment in such a case would be to plant on either side a single row of some spreading-crowned tree, of maximum height growth up to about 30ft., giving each room to develop its natural spread. Such lines might be of the same species on both sides, of different species on opposite sides, or of a variety of species mixed in each line. They could be all evergreen (such as small cypresses, juniper, or native species), all deciduous, or, better, a mixture of both. The following exotic species could be used provided they are suited to the locality: *Idesia polycarpa*, silver birch, Japanese maples, *Salix caprea* (pussy willow), *Cupressus sempervirens*, *Retinospora plumosa*, and many of the small native tree species which form admirable margins for driveway planting of this type, especially in some coastal areas; some of these would be *Pittosporum tenuifolium*, *P. eugenioides* (lemon wood), *Melicytus ramiflorus* (mahoe), *Phebalium nudum*, *Phyllocladus trichomanoides* (of slower growth), and some of the taller-growing *Olearia* species such as *O. albida*, and *O. traversii*, most of which stand a great deal of exposure to wind.

These trees should be planted about 10ft. apart in the line and in five or six years would develop to form an attractive lining for the roadway. They should be 6 to 10ft. from the edge of the traffic track and about 5ft. from the fence line; allowing a 10ft. track, the total enclosed strip would be about 40ft. wide.

Whatever combination of species is used, an attractive variation can be introduced by inserting here and there in the lines a tree of vivid foliage such as Japanese maple, species of *Rhus*, a flowering crab, or a small species of Japanese cherry.

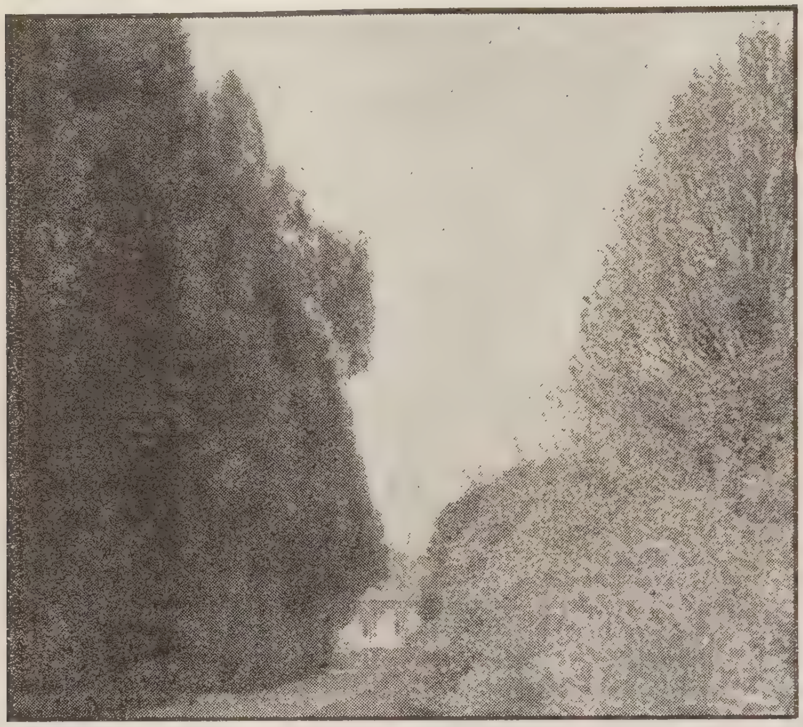
A better arrangement for a short driveway is to plant only one side with trees or shrubs and complete the roadway by growing a hedge on the opposite margin. The hedge may be either of a stock-proof species such as barberry, planted under the fence wires as on the rest of the farm, or one of the more attractive hedges mentioned earlier. Such an arrangement requires less land than a double-lined driveway, but the hedge should be maintained in good condition, which entails labour in trimming. The illustration at the left shows the effect of planting widely-spaced broadleaf trees on one side of a driveway, but in this instance the value of the shade planting is the main feature, and the trees, though bordering the driveway, are planted along the edge of the adjoining paddock.

A driveway lined on one side by widespread shade trees of sweet chestnut, oak, and pear.

Shelter Driveways

The planting up of long driveways purely for the sake of amenity is not economic in these days, and where a long approach across farm lands is necessary efforts should be made to plan the access in conjunction with shelter requirements. For a formal avenue or an institutional drive a wide, fully-lined roadway may be desirable, but for a farm driveway it is seldom suitable in these days when land, fencing material, and labour must be considered. It is not necessary that the whole length of driveway should be lined with trees, but where their position for shelter can be approximated to the required line of driveway the two purposes may be combined with advantage in a shelter driveway. It may pass through the centre of a shelter break which is made up of more than one row of trees, but this requires a wider enclosure, and such a roadway is likely to be shaded and wet. The driveway with one margin open to the sun is more satisfactory.

TREES FOR THE FARM APPROACH



A short driveway with a planted margin of graded trees and shrubs, opposite which is a solid belt of *Cryptomeria japonica* which was planted too close to the road and has become too tall in only 26 years.

Where the requirements of both shelter and direct access can be fulfilled, a satisfactory shelter driveway may be formed in which only one margin is planted in trees. In this case the driveway is planned to pass along the sheltered side of any windbreak. If it is fenced along its open edge, it may be possible to dispense with the inner line of fence round the shelter belt where the driveway runs parallel, but the expediency of this depends on the use made of the driveway by stock.

The width and density of the shelter margin depend on the standard type of shelter adopted on the farm. In many cases a windbreak only one row thick is not efficient, and where possible trees should be planted in a multiple belt—that is, of more than one species and at least two rows thick, one or more rows being to produce height and the others to increase the density of the screen near the ground.

Graded Planting

When a combined shelter and driveway is planted the trees should be arranged with the high-growing species furthest back from the road and on the exposed margin, with trees of less height on the inner side, and possibly a line of small trees or shrubs nearest the road. This graded planting gives an appearance of upward sweep to the border and usually allows more sun and light to penetrate to the road. Such planting is useful in a driveway lined on both sides, and especially effective where the driveway widens out in the vicinity of the house. Here it is possible to grade down from widely-spaced, permanent, tall trees in the background, through a series of lower, more densely-crowned trees, to small trees and low shrubs on the margin of the track.

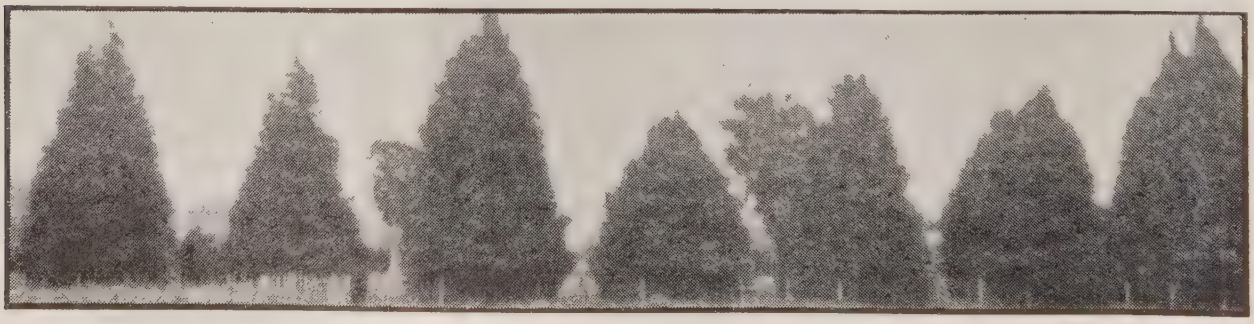
Such a graded planting is illustrated on the left. It is composed of widely-spaced, large-crowned plane trees at the rear, with a front row containing bushy shrubs such as rhododendron, Japanese maple, native five-finger (*Nothopanax*), *Retinospora,* and cypress.

Another good combination for an effective shelter driveway is formed by a rear line of eucalyptus species, *E. viminalis* or *E. amygdalina,* preferably mixed with the coloured flowering types such as *E. leucoxylon* or *E. ficifolia,* with a forward line, about 12ft. away, of *Cryptomeria elegans* spaced at 15ft., or alternatively planted with bushy *Cupressus* such as *Retinospora plumosa* or *C. sempervirens.*

Evergreen Avenues

Combined shelter driveways may be formed satisfactorily by the use of evergreen trees or shrubs alone, but they tend to present a uniform, formal appearance with no colour variation, and the home dweller lacks the satisfaction of watching the seasonal changes which are provided by a deciduous mixture.

However, in localities suited to it, and where ample land can be spared, an excellent shelter driveway is obtained by planting Lawson's cypress. It forms a good shelter screen and retains its attractive shape and appearance until maturity, but certain points must be considered when this species is used. To get the best value from this tree, each one should be allowed enough space to develop and maintain its individual shape. Though the chief object of growing them thus lies in their attractive appearance, it is also preferable from a practical viewpoint in that the trees require no trimming and little attention after they are established. To obtain this effect trees should be planted about 30ft. apart in the line, but at this spacing an unbroken shelter line is not formed for some years, and often it is necessary at the start to plant between the permanent cypresses some quick-growing, bushy species which will fill the gaps temporarily but must be cut out gradually as the branches of cypress spread.

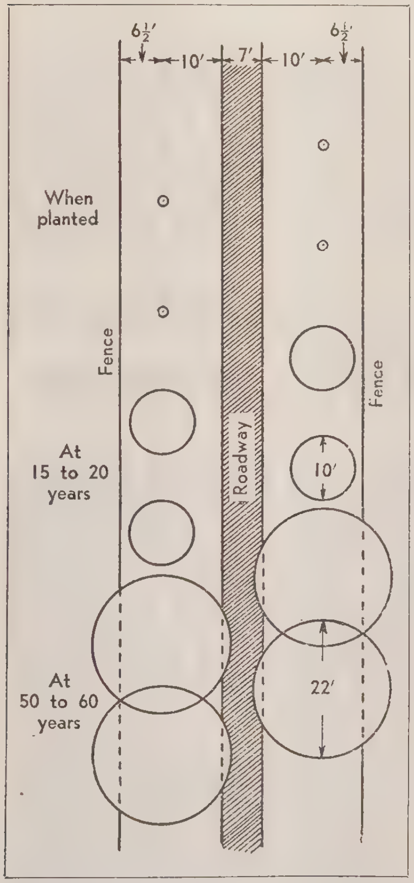


Lawson's cypress trees showing their characteristic shape. They were originally planted with alternate *Pinus radiata,* which were cut out when they threatened to crowd out the cypresses.

Lawson's cypress can be grown closer and will close up earlier, but then the advantage of single trees is soon lost, and a dense hedge results which requires constant trimming and in which root competition is intense, possibly resulting during drought in trees dying off singly or in patches.

Ample Planting Space Necessary

When driveway planting is planned it is seldom realised how far the spread of branches will reach, especially with evergreen species. Therefore the trees must be planted well back from the road, or in time they may grow across and close the passage. Lawson's cypress planted with only 20ft. between the lining rows may do that in about 10 years. The diagram below shows the area occupied by Lawson's cypress trees at different ages and is based on the layout of the driveway shown in the illustration at the right. In this example the total width of the enclosed strip was 40ft., with 27ft. between the rows, and when 15 to 20 years of age this forms a well-proportioned border to the road, leaving ample room for the traffic lane. However, from measurements of trees 50 to 60 years old in the same district it was found that the diameter at this age was about 22ft., and when this area is superimposed on the plan it can be seen what is likely to happen.



The space occupied by Lawson's cypress trees at various ages.

A driveway lined with 15-year-old Lawson's cypresses planted with 18ft. between trees and each row 10ft. from the road edge. At this stage there is ample room for the trees to spread.

Therefore, when planning to use Lawson's cypress in a driveway a minimum of 32ft. should be left between the rows lining a 10ft. road, allowing 11ft. radial spread for each tree.

Spacing between trees and rows must be similarly wide if some other conifers are used. For example, *Cryptomeria japonica* will form a rapid and dense shelter driveway, but is notsuitable for planting on both sides of the track because it grows rapidly into tall trees which shade the track at all times. It requires ample space for lateral branch development or else it must be kept cut back. The upper illustration on the opposite page shows the excellent dense edging which this species can make, but in this case the trees were planted too close to the edge and growth has encroached on the road, necessitating heavy cutting back and ultimate removal.

Pinus radiata, often planted two or three rows wide, is commonly used to line the farm driveway because of its rapid growth and the erraneous idea that it makes an easy shelter break. That is true in its young stages, but, like most pines, *P. radiata* tends to lose its lower branches with age and opens up below, admitting a ground draught, while the rapid height growth and heavy top branching produce a dark and unattractive marginal planting. Its main use in a driveway planting is as a temporary row in the rear of more permanent species, but in many cases the intention to remove the pines when the others are established is not carried out and driveways are ruined by the dominating pines.

Deciduous Avenues

Deciduous trees should not be used alone in a shelter driveway, as their bare trunks give no shelter unless they are in plantation formation in a thick belt which will afford collective protection. But an attractive driveway can be formed with an outer row of some low-branching species, such as Lawson's cypress, *Cupressus macrocarpa*, or *C. benthamii*, and widely-spaced broad-leaf trees lining the track and forming the dominant note.

Satisfactory broad-leaf driveways are possible only where ample space can be spared, as their beauty lies in their spreading crown habit and most of the popular broad-leaf trees ultimately grow very big. An oak tree at 40 or 50 years of age may reach a chain in diameter resulting in an avenue roofed over by branches.

For lining avenues with less space available, smaller trees such as silver birch, *Pawlonia imperialis*, some tralian pepper tree), *Idesia polycarpa*, native beech, *Schinus mollis* (Aus- *Pyrus aucuparia* (rowan) (in higher altitudes or colder localities) and many ornamental species can be used with safety.

Broad-leaf species alone can be used to form an efficient driveway, if a good hedge is maintained at the base, but the shelter value of such a belt is low, the hedge requires regular attention to maintain its efficiency and appearance, and there is the recurring problem of keeping down rank growth between the trees. After the trees are well established such a driveway can safely be opened to sheep and thus used as a grazing area.

The great advantage in the use of deciduous trees for a driveway is that al possible sunshine can penetrate in winter, and in summer the crowns form welcome shale from the glare of sun. They also allow a far greater variety of form and colour.

TOPPING OF PASTURES: SILAGE MAKING

SEASONAL NOTES contributed by the EXTENSION DIVISION

THE present is a time of high pasture production, and on dairy farms, even with the restriction in area grazed which is imposed by the closing of fields for hay and silage, milking cows and young dairy cattle are generally unable to cope with all the feed produced. Unless the rank growth is checked by mowing, subsequent production of high-quality, milk-producing fodder will be reduced. It is accordingly common practice to top pastures which are running to seed head, and this work is really an essential feature of intensive grassland management on dairy farms. In addition to keeping pastures nutritious, it is of advantage in controlling many weeds. Californian thistle, for instance, is readily eaten by stock when it is mown and wilted.

BEFORE seed heads grow mowing may be of considerable help in checking bloat in cattle caused by a high clover content of the grazed herbage, because actually, now that most dairy farms are equipped with tractors and power mowers, less labour may be involved in regularly mowing and wilting pasture growth containing a high proportion of white clover or subterranean clover than in keeping a watch on the herd and treating blown cows. Mowing also ensures that the cows are adequately fed, whereas the restrictive grazing methods often adopted when bloat is common frequently lead both to inadequate feeding of the herd and to increased liability to bloat when the hungry cows have access to a clover-dominant pasture.

There are, however, certain limitations to any farm practice, and the topping of pastures is no exception. Though it is most advantageous on the more fertile land and in average seasons, it may lead to loss of production on light land liable to dry out in the summer, and on most land it should be carried out before the end of December.

A stack of silage is the dairy farmer's best insurance against drought.

Topping a pasture with a tractor mower. Dairy heifers and dry cows should be used to clean up the cut herbage.

Even with the use of perennial strains of ryegrass and white clover, many areas of light land are capable of maintaining a good dairying sward only if a certain amount of natural annual reseeding of grasses and clovers is allowed, and any topping on such land should be done early, and any subsequent seed-head growth (and this is not likely to be heavy) should be left to allow natural seeding. Further, except in seasons with a very heavy summer rainfall, all topping should be completed by the end of December, because if dry weather follows a January topping, subsequent grass growth may be reduced.

The topping of a pasture should follow within a day or two of grazing by the dairy herd, and dairy heifers and dry cows should be used to clean up the cut herbage, which they will do very readily as soon as it wilts.

The aim should be to do most of the pasture topping in November, because if it is done then, the pastures will carry a much better growth into January.

THOUGH the making of grass silage has declined in recent years, chiefly because of the work involved in handling green material and the labour economy secured through the use of the pick-up baler in haymaking, the practice has much to commend it from the point of view of pasture management. The benefits it confers are generally greater than the apparent economies secured through total reliance on hay for supplementary feeding. Silage making allows early closing of paddocks and harvesting of the crop, and consequently the growth of a strong aftermath, and it does not exhaust the pasture sward which commonly occurs after late haymaking. Late cutting for hay sooner or later exhausts the better grasses and clovers and encourages the growth of Yorkshire fog and other inferior grasses.

Further, a reserve of fodder stored as silage is the dairy farmer's best insurance against drought, and such a reserve made in wet seasons and held over for dry seasons should be a feature of dairy farm management.

Considerable labour economy can be secured in silage making if the green material is ensiled in pits or trenches instead of in stacks, and when the soil is naturally free draining the material will keep almost indefinitely in a pit or trench.

◆

History of Young Farmers' Clubs Movement in New Zealand

FIFTEEN years have passed since the Young Farmers' Club movement began in New Zealand, yet many farmers and present members have little or no knowledge of the origins of the movement or an appreciation of its part in the development of New Zealand farming. It is particularly important that members of comparatively-new clubs and farmers in areas where there are still no clubs should have some knowledge of the origins of the movement, if only to help develop an active interest in the federation and to promote an appreciation of the organisation's growth and prospects and its advantages to farmers.

BEFORE coming to New Zealand Mr. J. E. Davies, Instructor in Agriculture, Department of Agriculture, had had considerable experience of the Young Farmers' Clubs movement in Wales. Under the guidance of Mr. R. B. Tennent, now Assistant Director-General of Agriculture and then Fields Superintendent, Dunedin, Mr. Davies formed three Young Farmers' Clubs in Otago, at Palmerston, Dunback, and Five Forks—clubs which are still active. Though the minimum age for members in England was 10 years, 14 was considered a more suitable minimum for New Zealand; that has never been altered, though the maximum age, first fixed at 25 years, was later raised to 30.

Agricultural Education the Basis

The first clubs were formed to further agricultural education among young farmers, and that remains the most important aim of the movement. The first programme carried out by the three original clubs was as follows: Lectures on types of pastures and swards, sowing down of pastures, pasture utilisation (rotational grazing, hay, etc.), silage, and certification, followed by a field day.

Mr. A. C. Cameron, general manager of the Otago Farmers' Union Mutual Fire Insurance Association, became actively interested in the development of the movement and gave considerable assistance to the new clubs, adding the support of his own organisation. In June, 1933, a young farmers' educational week, organised by Mr. Cameron, was held in Dunedin, when an appeal was made to those attending to form clubs in their own districts. The educational week was attended by 100 young farmers between 18 and 25 years of age, selected with the aid of branches of the Farmers' Union and the W.D.F.U. from available young men in all parts of Otago. Preference was extended to young men showing evidence of good character and leadership ability. Hospitality was provided for those requiring it, and rail or bus fares were met by the local branches of the Farmers' Union.

As a result of the educational week new clubs were formed at Clinton, Milton, and Paretai, the first two being still active. Subsequently clubs were formed at Moa Flat and Miller's Flat. Another educational week was held in Invercargill followed by others in Invercargill, Dunedin, and Christchurch in 1934.

Federation Formed

At the height of the depression many difficulties were experienced and there appeared grave danger that the movement would lapse. With the assistance of Mr. Cameron a federation was formed, and a member of his staff was appointed as general secretary. On March 16, 1934, members of all the existing clubs, with a number of people who had taken a keen interest in the movement, were represented at a meeting at Dunedin. At that meeting the New Zealand Federation of Young Farmers' Clubs was inaugurated, the rules and the constitution were adopted, and office bearers were elected. At the time of the meeting the clubs in being were Palmerston, Dunback, Five Forks, Clinton, Milton, Paretai, Moa Flat, and Miller's Flat.

The resolution to form the federation was proposed by Mr. N. Wright, president of Palmerston club, and seconded by Mr. W. I. Clarke, Clinton club. That the federation be incorporated under the Incorporated Societies Act, 1908, was proposed and seconded by Messrs. A. F. Shaw (Paretai) and D. Clearwater (Palmerston). The first officers of the federation were: Grand patron, the Governor-General, Lord Bledisloe; patrons, the Director-General of Agriculture, Sir Heaton Rhodes, Sir John Roberts, Colonel Studholme, and Mr. R. A. Anderson; president, Mr. A. C. Cameron; vice-president, Mr. R. B. Tennent; general secretary, Mr. S. D. Blomfield; treasurer, Mr. C. F. Jones. The first general executive committee consisted of Messrs. J. Begg, F. Waite, G. A. Holmes, W. Lee, J. E. Davies, and M. Austin.

Rapid Progress

After the incorporation of the federation new clubs were formed rapidly and by January, 1935, there were 7 in Canterbury, 26 in Otago, and 5 in Southland—a total of 38 affiliated South Island clubs—and several in the North Island, all in the Wairarapa district.

One of the first duties of the federation's executive committee was to form provincial councils, these being established in Otago, Southland, and Canterbury, with their members appointed by the executive committee in the first instance. In addition an advisory committee was established, consisting of the Director-General of Agriculture, the Director of the Fields Division, Mr. T. Rigg, Dr. D. Miller, Professor R. E. Alexander, Dr. F. W. Hilgendorf, Dr. Hercus, Dr. Hight, and Mr. F. Milner.

The first official activity of the federation was a combined field day

[*S. P. Andrew Ltd. photo.*

This photograph was taken at the first meeting of the Dominion executive elected after the general reorganisation of the movement in 1936. Those in it are: Seated—Messrs. S. Freeman (Dominion organising secretary), L. J. Wild (Dominion vice-president and chairman of the North Island council), A. C. Cameron (Dominion president and chairman of the South Island council), R. B. Tennent (Director of the Fields Division), and W. C. Barry (Director of the Livestock Division); standing—Dr. M. C. Franklin (Lincoln College), Messrs. J. B. Chrystal (Manawatu), G. Nutt (Canterbury), Hon. F. C. Waite (New Zealand Farmers' Union), A. W. Hudson (Massey College), J. H. Bremner (Wairarapa), C. Whatman (South Canterbury), W. F. McLaren (vice-chairman of the North Island council), and A. Grant (vice-chairman of the South Island council).

organised by the president and held at Bushey Park estate during the visit to Otago of the Governor-General, Lord Bledisloe.

During 1935 a new provincial council was set up in Nelson-Marlborough and another in the Wairarapa, where a number of clubs had come into being through the interest of Mr. S. Freeman, Fields Instructor, Department of Agriculture, Masterton. Radio talks to young farmers had been developed, and plot experimental work undertaken in some areas. Applications were made to the Government for a financial grant, but that was deferred temporarily. Various competitive activities had been instituted, and Moa Flat club had won a cup presented by the Point Blank Press Company for the best district survey by clubs. A Y.F.C. scholarship donated by Lincoln College Old Students' Association was given during the year.

General Reorganisation

By 1936 the scope and activities of the movement had increased considerably, and in that year a truly national organisation came into being, as the federation at its annual meeting accepted an offer made by the Department of Agriculture, through Mr. R. B. Tennent, then Director of the Fields Division, to provide the services of a departmental officer as a full-time general secretary and the services of its Fields Instructors as local district organisers and secretaries. The Department also undertook to meet the salary and expenses of the general secretary and to provide him with office accommodation, clerical assistance, free stationery, and similar requisites.

After the adoption and implementation of the Department's offer the head office of the federation was transferred to Wellington and the existing provincial councils were abolished and replaced by the North and South Island councils, with a number of district committees. The first South Island council consisted of Messrs. A. C. Cameron (chairman), G. A. Holmes (vice-chairman), S. D. Blomfield (secretary), W. R. Harris, G. MacKay, J. Hunt, S. P. Cameron, G. Anderson, M. Austin, A. Grant, A. P. Bruce, A. E. G. Lyttle, L. W. McCaskill, R. C. T. Raine, and T. H. Robinson, with the two Fields Superintendents, two members nominated by Lincoln College, two nominated by Cawthron Institute, and a club member from each district committee. The North Island's first council consisted of Messrs. L. J. Wild (chairman), W. F. McLaren (vice-chairman), G. H. Holford (secretary), R. B. Tennent, A. E. Diprose, W. Parsons, E. Alexander, A. W. Hudson, and S. Freeman, with the Fields Superintendents and club delegates.

The general executive committee mentioned earlier was reconstituted and renamed the Dominion executive committee; it consisted of a president, a vice-president, four representatives from each island council, two representatives from the Department of Agriculture, and one representative each of the New Zealand Farmers' Union, the Royal Agricultural Society of New Zealand, Lincoln College, and Massey College.

Mr. S. Freeman, then Fields Instructor, Masterton, was appointed by the Department of Agriculture as Dominion organising secretary; that appointment arose from the interest in the movement shown by Mr. Freeman, who was responsible for the formation of a number of clubs in his district—the first group of clubs in the North Island.

After the reorganisation the first meeting of the new Dominion executive committee took place on April 14, 1937. By then there were 60 clubs in the South Island and 58 in the North Island and club activity had increased in scope to include field days, competitions of many kinds, social gatherings, district tours, and agricultural weeks.

Publicity Measures

In the early stages 2 pages of Y.F.C. material were included in the monthly issues of "Point Blank", the official organ of the Farmers' Union, and reprints in leaflet form were distributed to all members each month.

Toward the end of 1937 the Department of Agriculture offered to make the "Journal of Agriculture" the official organ of the federation, the "Journal" to devote up to 6 pages a month as a special Y.F.C. section, the annual subscription to be 1s. a year, post free, for active Y.F.C. members. The offer was accepted, and subsequently the constitution was altered to increase the annual subscription from 2s. 6d. a member to 3s. 6d., the extra 1s. to be forwarded to headquarters by club secretaries to cover the cost of "Journal" service. Under that arrangement all members became subscribers to the "Journal of Agriculture", at the concession rate, the "Journals" being posted individually to members' addresses instead of the bulk distribution which had been the practice until then.

In 1946 the post-war revival of the movement made increasing demands on the available space in the Y.F.C. section of the "Journal", and the Department arranged to provide the organisation with a 16-page supplement devoted entirely to Y.F.C. affairs. The Supplement is sent with the "Journal" to all Y.F.C. members and is also available to other interested subscribers who apply for it to the federation's headquarters. The first issue of the Supplement appeared in July, 1946.

In 1937 the Government agreed to make a grant of £500 to the federation in addition to the various costs of the movement borne by the Department of Agriculture. That grant has been paid annually ever since, and was increased to £1000 in 1948.

Stock-judging Competitions

In November, 1937, a national stock-judging competition was held at the Royal Show in Palmerston North, when 70 North Island and 31 South Island members competed in four classes, 203 individual entries being received. This competition was the basis of selection of four members of a party of five invited to tour Australia on the occasion of the sesquicentennial celebrations. The winners of the four classes were A. Fisher, Carterton club (Romneys), H. McKenzie, Carterton (Jerseys), A. Viles, Apiti (Clydesdales), and A. Cowan, Apiti (pigs). A South Island member of the team for Australia was selected, being C. M. Whatman, of the Waihaorunga club, who was appointed leader of the party. At Sydney Royal Show stock-judging competitions Cowan and Fisher gained second place in the dairy cow class and third place in the pig class respectively in the students' division.

Visit of British Young Farmers

In April, 1938, four young farmers from Great Britain, who had also taken part in the tour of Australia, accompanied the returning New Zealand party and spent 20 days touring New Zealand. This was the first visit to the Dominion of any official overseas Y.F.C. party, and it was followed in 1940 by a visit by two Western Australia Junior Farmers' Federation members.

To mark the New Zealand centennial year the federation had invited Y.F.C. organisations and similar movements throughout the Empire to send parties to New Zealand, where they would become guests of the federation at the Centennial Show in Wellington and later during a tour of the Dominion. The outbreak of war interfered with the plans and only the Western Australia members were able to visit New Zealand.

The first post-war official Y.F.C. visitor from overseas was Austin Ninnes, winner of an all-Australia champion young farmer contest, who visited New Zealand in April, 1947, under the sponsorship of the Australian Broadcasting Commission. He was in New Zealand for about 6 weeks and during that time he saw most of the country's farming areas and attended a wide variety of Y.F.C. activities.

Important Changes in 1938

In 1938 the North and South Island councils were abolished and four new councils were instituted—Otago-Southland, Canterbury, Wellington, and Auckland. The constitution of the Dominion executive committee was simultaneously altered to provide for representation from each of the new councils.

Other changes in the rules included the raising of the age limit for active membership from 25 to 30 years (at the request of members themselves), the alteration in designation of some unit office bearers and the establishment of a Dominion executive emergency committee.

National competitions were proposed in 1938, when plans were made for a national stock-judging competition to be held in 1939 and for debating contests to be placed on a national basis. A national shearing competition (abandoned during the war period and not yet revived) was also instituted, and educational inter-district tours were begun.

Wartime Decline in Strength

Early in 1940 there were 207 clubs with a total active membership of about 6000. The war caused a diminution of organised activity in the clubs, and as it progressed an increasing number of clubs found it necessary to go into recess. Early in 1941 there were still 172 active clubs, but by the end of that year the number of active clubs had been reduced to 126 and the federation was faced with the need for reducing its activities considerably. Early in 1942, with only 81 clubs still active, a plan was drawn up whereby units of the federation could be kept alive for the duration of the war. By the date of the eighth annual general meeting (July 1, 1942) clubs had fallen in number to 67 and further modifications of the organisation's programme were adopted. Of these 67 clubs still nominally active a number held only annual meetings and did not engage in any other form of club activity.

Clubs in Armed Forces

In 1941 a club was formed in a regiment of the Second N.Z.E.F. in the Middle East, and subsequently a large number of clubs came into being in the armed forces. Apart from several clubs in the Middle East in both field units and base areas such as hospitals and convalescent depots, a chain of 14 clubs was formed in the Pacific area in army units, one was formed in a prisoner-of-war camp in Italy, and others were formed in air force stations in the Middle East, Pacific, and New Zealand. There was also a club in the army camp at Palmerston North.

Land Settlement

Despite the curtailment of club activities caused by the war, several important policy matters received consideration in 1941 and 1942. Early in 1941 consideration was given to the need for the development of a land-settlement scheme, and the subject was further dealt with at subsequent meetings of the Dominion executive committee. Progress in developing a clear-cut and satisfactory policy was necessarily slow, and little could be done during the war years.

Since then the project has been approached with renewed vigour, and the federation is at present preparing a survey of the land-settlement needs of its members as a major step toward the further elaboration of a concrete scheme.

National Memorial

Early in 1941 the need for a national Y.F.C. war memorial was recognised and preliminary discussions on that project took place during the year. The principle of a national memorial was fully approved at the federation's annual general meeting in 1942, and subsequently all units of the organisation were given the opportunity to submit suggestions on the form the memorial should take. At its annual general meeting in 1946 the federation approved the recommendations of the special national memorial sub-committee.

A sheep demonstration at a Y.F.C. field day. Agricultural education remains the most important aim of the movement.

The scheme adopted embraced the provision of additional accommodation at Massey and Lincoln Colleges to enable Y.F.C. members to take advantage of special short courses for them. The proposed memorial buildings, which will house appropriate records of members who lost their lives on active service, will thus provide an enduring and creative memorial to the war services of the movement's members. Of its pre-war membership of about 6000, more than 3500 saw active service and about 500 lost their lives. The sum needed for the proposed buildings is estimated to be £20,000 and members are at present engaged in raising that sum. It is hoped to close the fund before the annual general meeting in June, 1949.

Country Girls' Clubs

During the war period it was suggested that girls should be admitted to Y.F.C. membership, but the idea did not meet with general approval. Instead, the proposal arose of sponsoring a sister organisation of clubs to cater for the needs of country girls. Progress with that scheme has been slow, but a number of clubs were established in Canterbury and later three in the North Island. On August 25, 1948, at a meeting in Timaru of representatives of the Y.F.C., Country Girls' Clubs, and the Department of Agriculture, the New Zealand Federation of Country Girls' Clubs was formed.

Post-war Revival

The organisation was just reaching the point of firm establishment in all parts of the Dominion when war caused a temporary setback, but the re-establishment of the movement on its peacetime basis took place rapidly after the cessation of hostilities. At the date of the annual general meeting in 1942 there were 67 active clubs, in July, 1943, 62, and in July, 1944, 72. By July, 1945, there were 104 active clubs, a total which grew to 210 by July, 1946. The growth of club strength is shown in the table on this page. The membership of the organisation in 1948 exceeded 9000 including advisory members.

Suspended during the war, certain national activities have been renewed and keenly supported. Major activities include the national stock-judging competitions, for which entries are received from district teams, and the debating contest, in which inter-club, inter-district, inter-council, and inter-island rounds carry the winning team to the national championship.

Inter-district and inter-island tours have been developed with enthusiasm, and this year 13 districts organised touring parties. The most favoured type of tour from the point of view of educational values is the billeted tour, in which touring members are billeted with hosts for 1 to 2 weeks, thus entering into the home and farm life of the hosts, to their mutual advantage and enlightenment. Less beneficial are the purely sight-seeing conducted tours in which hotel accommodation is availed of and local places of interest are visited. Popular in some localities is the industrial tour, in which parties visit the cities to see over factories or other large industrial institutions.

A promising future is indicated for the Y.F.C. movement. Pursuing the aims of improving agricultural education, giving training in leadership, and developing social life in rural areas, the organisation offers a valuable opportunity for enhancing the status of all farming communities.

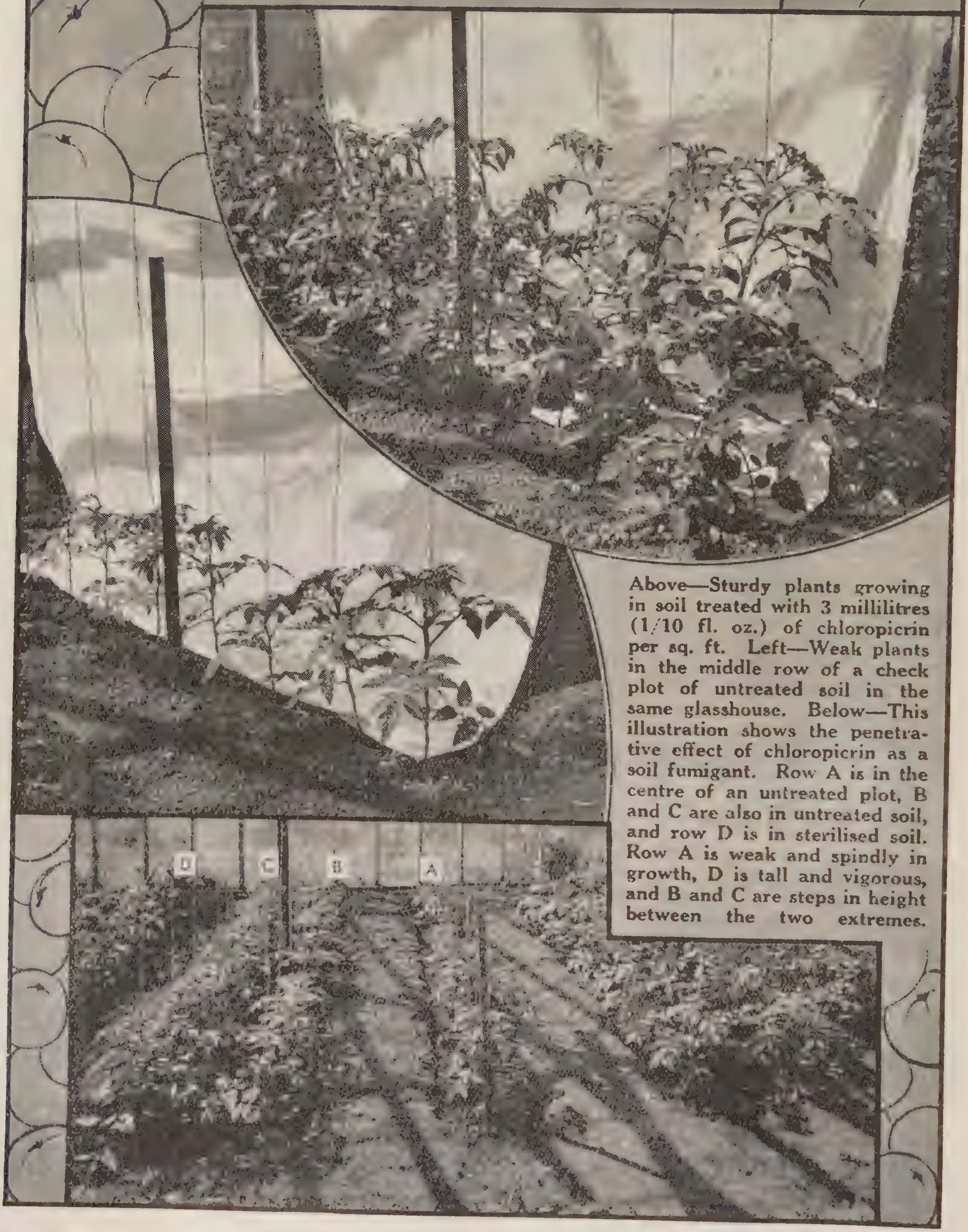
The aims of the federation are the improvement of the standard of farming and citizenship of the young farmers of the country. Such aims must ultimately affect also the standards of life of the country as a whole.

◆

NUMBERS OF YOUNG FARMERS' CLUBS

Council	Pre-war	1943	1944	1945	1946	1947	1948
Otago-Southland ..	35	12	14	20	29	38	47
Canterbury	38	17	21	27	46	53	54
Wellington	77	18	18	29	69	90	97
Auckland	53	15	19	28	66	97	108
Totals	203	62	72	104	210	278	306

DISINFECTION OF GLASSHOUSE SOIL



Above—Sturdy plants growing in soil treated with 3 millilitres (1/10 fl. oz.) of chloropicrin per sq. ft. Left—Weak plants in the middle row of a check plot of untreated soil in the same glasshouse. Below—This illustration shows the penetrative effect of chloropicrin as a soil fumigant. Row A is in the centre of an untreated plot, B and C are also in untreated soil, and row D is in sterilised soil. Row A is weak and spindly in growth, D is tall and vigorous, and B and C are steps in height between the two extremes.

[*Sparrow Industrial Pictures Ltd. photos.*

Chemical Disinfection of Glasshouse Soil for Tomato Crops

STEAM sterilisation, long considered the most effective method of soil sterilisation, is often beyond the means of the owner of a small glasshouse because of the cost of installing a steam plant. In such cases the grower must depend on the cheaper but less efficient method of soil sterilisation by chemicals. The most commonly-used chemical has been formaldehyde, but though efficient as a fungicide, it has decided weaknesses as an insecticide. Consequently considerable interest has been shown in some of the new sterilising agents, such as chloropicrin (tear gas), Shell D.D., and Iscobrome, which show promise of effectively combating insect pests of the soil, especially eelworm, a troublesome pest in many glasshouses.

THIS article by S. O. Gillard, Instructor in Vegetable Culture, Department of Agriculture, Auckland, describes a series of field trials laid down by H. Jacks, Plant Pathologist, Plant Diseases Division, Department of Scientific and Industrial Research, Auckland, using chloropicrin, Shell D.D., and Iscobrome for the control of eelworm and verticillium wilt. Trials were laid down in three glasshouses before tomatoes were planted.

Chloropicrin, Iscobrome, and Shell D.D. were injected into the soil with a special appliance which is now available to growers. It consists of a reservoir to carry a supply of the chemical and a plunger which forces a regulated quantity of the liquid down through a tubular stem, perforated at its lower end. The tube is fitted with a wide collar which may be set to regulate the depth to which it is to be pushed into the soil before each charge is delivered.

Before treatment the soil, which was slightly damp, was well worked up, free from large lumps, and the top ½in. thoroughly and evenly wetted to reduce the escape of unpleasant fumes into the air.

The ground area of each glasshouse was marked out with parallel lines 12in. apart, along which injections were made at 12in. intervals, beginning 6in. from the side of the house. Each charge was made 6in. below the surface. Injector holes were closed immediately to retain the gas seal, and the ground surface was watered again at 1 to 1½ gallons a sq. yd. when the whole area had been treated. All doors and ventilators were kept wide open during the operation, after which they were closed and the soil left undisturbed for 48 hours. On the third day all doors and ventilators were opened and the soil aerated by forking it over. After 10 days to allow complete dissipation of gas, the tomato plants were set out.

Trial No. 1: Autumn Crop, 1947

The glasshouse in which the first trial was made had been used for the production of two crops annually and the soil, a sandy clay loam, had become heavily infested with eelworm. The area of 2160 sq. ft. was treated with 3 millilitres (1/10 fl. oz.) of chloropicrin a sq. ft. before the planting of an autumn crop of 640 plants of the Potentate variety.

The plants made excellent growth throughout their growing period, carrying dark green foliage and a very satisfactory crop for autumn planting, being almost as heavy as an average main crop. The total yield was 2880lb., an average of 4½lb. a plant. When the plants were removed from the house after the crop had been harvested there was no sign of eelworm infestation.

Trial No. 2: Main Crop, 1947

One main crop of tomatoes had been grown yearly in the glasshouse used for the second trial. The soil, a medium volcanic loam, was infected with verticillium wilt. The area of the house was 2700 sq. ft. and it contained 1100 plants of the Potentate variety. Chloropicrin was again used at the rate of 3 millilitres a sq. ft. Untreated check bays containing three rows of 12 plants were left at each end and in the centre of the house.

Plants in the treated areas yielded 10lb. of tomatoes a plant and had no infection of verticillium wilt; those in the check plots yielded 7¼lb. a plant, with 100 per cent. of verticillium wilt infection. Plants in the treated areas were sturdy and vigorous, carrying heavy trusses of evenly-developed fruit; those in the middle rows of the check plots were comparatively spindly and unhealthy in appearance, with smaller trusses bearing fruits which did not attain the size usual in a healthy crop.

The penetration of chloropicrin through the soil was well illustrated in this test. To fit in with the supporting posts of the glasshouse roof, plants were set in alternate double and single rows, the posts coming between the plants in the double rows, with a single row running down the centre of each bay. Each check bay had a centre row well away from treated soil, while the outer rows of check plants were within 18in. of chloropicrin-treated soil. In the centre row the plants received no benefit from the treatment and were weakest; in the outer rows the plants showed some benefit from the treatment of adjoining plots.

Trial No. 3: Main Crop, 1947

A small glasshouse containing soil heavily infected with verticillium wilt and with a serious infestation of eelworm was selected for the third test. Chloropicrin, Shell D.D., and Iscobrome I and II were applied to plots of about 40 sq. ft. each; 27 plots with varying treatments were placed at random through the house. No check plots were used.

The table below sets out the results of the treatments; representative rows from each treatment were selected for weighing.

Treatment	Rate of application per sq. ft.	Average heights of plants 8 weeks after planting	Percentage of plants affected by wilt	Percentage of plants affected by eelworm	Weight of fruit from 1 row of 9 plants
Chloropicrin ..	3ml.	14in.	Nil	Nil	32lb. 11oz.
Shell D.D. ..	3ml.	4in.	10	Nil	31lb. 8oz.
Iscobrome I ..	3ml.	12in.	Nil	Nil	36lb. 4oz.
Iscobrome II ..	3ml.	12in.	Nil	Nil	37lb. 0oz.
Chloropicrin and Shell D.D. ..	1½ml. of each	12in.	Nil	Nil	42lb. 13oz.

Though the plants in this house set a normal number of fruits, the tomatoes did not size up well, probably because of cold temperatures in spring. The owner of the house lives 3 miles away and could not give satisfactory attention to ventilation of the house. He was obliged to open ventilators in the morning and, regardless of changes in weather, leave them open until evening.

When the plants were measured at the first-truss stage it was found that chloropicrin had had its characteristic stimulating effect on growth. Plants in plots treated with Iscobrome I and II and in the combined chloropicrin and Shell D.D. plots also showed good growth. Shell D.D. had a depressing effect in the early stages of plant growth, but probably that could be avoided by allowing a longer period between treatment and planting. The depressing effect was not noticeable later in the season.

All treatments were fully effective in the control of eelworm, but in this trial Shell D.D. did not give full protection against verticillium wilt.

Cost of Treatment

The cost of chloropicrin treatment is about £4 14s. 6d. per 1000 sq. ft. of glasshouse for material only, comparing favourably with the cost of soil sterilisation using formaldehyde, £3 5s. 7d. Iscobrome treatment was slightly more costly than chloropicrin, and Shell D.D. somewhat cheaper.

Chloropicrin appears to increase plant vigour, and to avoid over-stimulation of the plant to vegetative growth it may be found necessary to reduce slightly the application of nitrogenous fertiliser.

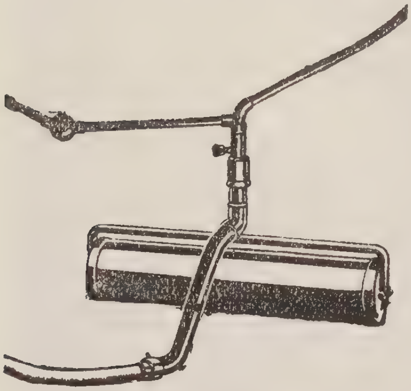
The results of the trials indicate three promising chemical treatments in place of steam sterilisation.

The
TOMOANA
way
MAKES PIG FARMING PAY

Throughout the Driest Spell, the

"SPRING-SHOWER"

SPRINKLER



gives a perfect curtain of water without puddles, and greener and healthier—

- ★ **Gardens**
- ★ **Bowling Greens**
- ★ **Parks and Reserves**
- ★ **Show Grounds**
- ★ **Racecourses**
- ★ **Lawn Tennis Courts**
- ★ **Golf Course "Greens"**
- ★ **Orchards**

Covers 115 feet diameter at 50lb. pressure. Only one moving part—variable speed—even distribution. A superior rotary sprinkler that has been carefully designed.

Don't wait for the dry spell—order now while we have stocks and be ready for the hot weather.

BROWN BROS
ENGINEERS LTD.
PUMPING MACHINERY SPECIALISTS

590J COLOMBO STREET
P.O. BOX 548J, CHRISTCHURCH

BANK OF NEW ZEALAND

Travellers' Cheques

are a safe and convenient method of meeting expenses when travelling, without carrying bank-notes. They are negotiable by Hotels, Boarding Houses, Shipping Companies, Transport Services, Government Railways, Tourist Department, and any bank or business firm. They can be purchased from any Branch of the Bank of New Zealand, from the Government Tourist Department and from Thomas Cook & Son. Obtainable in £2, £5 and £10 denominations.

HOTEL
SPLENDIDE

☆ SAFER TO CARRY THAN BANK-NOTES
MORE EASILY NEGOTIABLE THAN CHEQUES

Bank of New Zealand

SERVING OUR DOMINION SINCE 1861

6.8A

USE THE WORLD'S BEST
MILKING RUBBERWARE
REIDRUBBER

STRAWBERRY SAYS—
"Contented cows are the ones milked by Reidrubber inflations—and the Boss says you can't beat Reidrubber for sheer quality."

REIDRUBBER

REID NEW ZEALAND RUBBER MILLS LTD., GREAT SOUTH ROAD, AUCKLAND.

Control of Blackberry and Gorse with Hormone Sprays

Trials in Canterbury

BECAUSE of the number of inquiries regarding the use of hormone sprays on gorse *(Ulex europaeus)* and blackberry *(Rubus fruticosus)* it has been decided to give details of preliminary trials in Canterbury, which are discussed in this article by J. F. Brown, Assistant Fields Instructor, Department of Agriculture, Christchurch. At the outset it must be emphasised that the results are by no means final and much work has yet to be done before any definite recommendations can be made.

Blackberry treated with oil-based 2, 4D. No regrowth is apparent. Note the brittle nature of the stem that has been broken, in the middle of the photograph.

IN the past numerous methods have been used in attempts to control gorse and blackberry, none of which has been really successful in securing eradication. Where ploughing is possible, both blackberry and gorse may be controlled, but in other circumstances eradication is extremely difficult. Of the weedkillers used in the past, probably the best has been sodium chlorate, which has been applied in an endeavour to poison the plants. But sodium chlorate is dangerous to use and it has given rather erratic results.

Scope of Operations

It is not anticipated that the method for the control of blackberry and gorse described in this article will be effective for extensive operations on thickly-infested areas because of the cost and because it would not be possible to handle large-scale spraying machinery in some types of country. On the other hand, it is felt that the method may be valuable in preventing further spreading, by the eradication of small patches, particularly in areas which are difficult to cultivate.

Experiments carried out on blackberry using hormone weedkillers diluted in water gave disappointing results. At first the blackberry showed slight signs of curling of the minor stems and wilting of the leaves, but this effect was only temporary, as the blackberry, both old and young, soon recovered and came away with much stronger growth than before, producing some abnormally-large berries. If spraying is done at the flowering and fruit-setting stage, however, flowering and fruit setting may be affected.

Trials on gorse have had some effect, but have not always succeeded in killing even the seedlings. Of the treatments used, the oil-based hormone spray (ethyl ester of 2, 4D) has been the most effective, but this is of little consequence, as, apart from causing some wilting and curling of the shoots and slight yellowing of the foliage, little damage was done and the gorse soon recovered.

Addition of Power Kerosene

Blackberry: It is known that power kerosene has a toxic effect when sprayed on some plants. When blackberry was sprayed with power kerosene no damage was done apart from a slight burning of the leaves, from which the blackberry recovered in a few weeks. A combination of the hormone weedkillers and power kerosene was then tried and good results were obtained in the first trial. Within a week all the foliage on the blackberry turned a brownish-black colour, showed severe wilting, and became very brittle. A few days later most of the leaves had fallen and the stems turned reddish. In time the colour darkened and after about 6 or 7 weeks the stems were greyish-white,

This blackberry should have been sprayed twice, as many stems at the base were missed during the first spraying, with the result that they have shot away through the dead branches along the top of the bushes.

very dry, and brittle. More extensive experiments showed that where the blackberry is well established it is necessary to spray a second time, as, owing to the very dense foliage, it is almost impossible to avoid missing portions of the plant, which, if left, shoot away again.

Experiments have shown that the leaves and stems of blackberry must be thoroughly soaked by the spray if good results are to be obtained.

Gorse: With gorse, too, the hormone and kerosene mixture gave encouraging results. Within a few days of spraying, the whole of the foliage became brownish-yellow and there was pronounced wilting and curling of the minor branches and thorns. At first it appeared that the gorse, both old and young, remained in this state, but an examination 6 weeks later showed that the branches had become dry and brittle.

It has been found difficult when using a knapsack sprayer to get a thorough coverage of fully-grown gorse bushes, but experiments carried out on plants up to 4ft. high have given very good results. Gorse sprayed last year with the hormone and kerosene mixture has shown no signs of recovery and may be considered dead.

Most Effective Mixture

Difficulty was experienced in mixing water-based hormone weedkillers with power kerosene, and even where the mixture was continually agitated results were disappointing. On the other hand the oil-based hormone weedkiller was easier to mix with power kerosene and it was with this mixture, at the rate of 1 part of ethyl ester to 50 parts of power kerosene, that the most satisfactory results were obtained.

It is important to spray blackberry and gorse only when they are growing strongly. As more spray will be absorbed when the plant is carrying the maximum foliage, the best time to spray is from mid-November to the end of January.

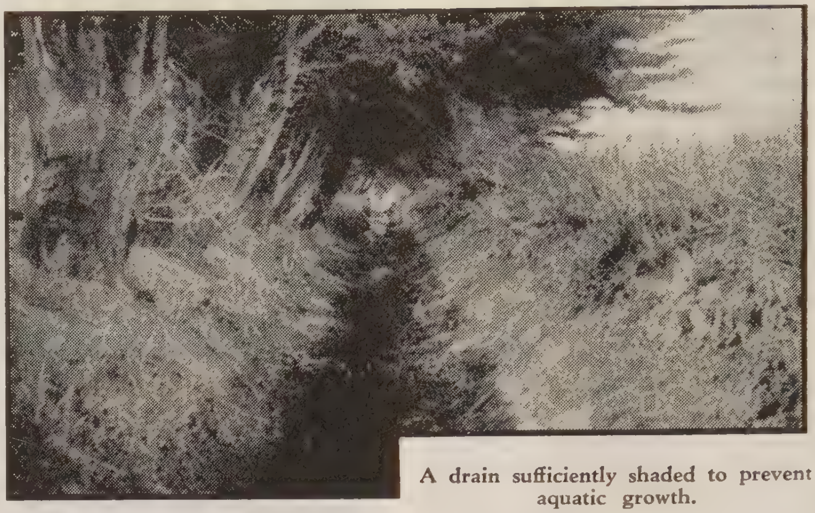
When trials were carried out on blackberry during the late autumn the chemicals did not pass far enough into the blackberry to be effective. It is advisable to choose a warm day for the application of hormone weedkillers and the work should not be done after rain or during showery weather, because if the leaves are coated with water, the kerosene mixture will be inclined to run off instead of being absorbed.

Conclusion

Though good results have been obtained in Canterbury by using the oil-based hormone weedkiller and kerosene mixture, experimental work will have to continue for a year or two before a final pronouncement can be made. In other districts trials have not always been as successful as those in Canterbury, but in many cases the mixture has been found quite effective.

Until more conclusive results are obtained it would not be advisable to treat any but small patches of blackberry or gorse about the farm.

TREES CAN REDUCE WORK OF MAINTAINING OPEN DRAINS



A drain sufficiently shaded to prevent aquatic growth.

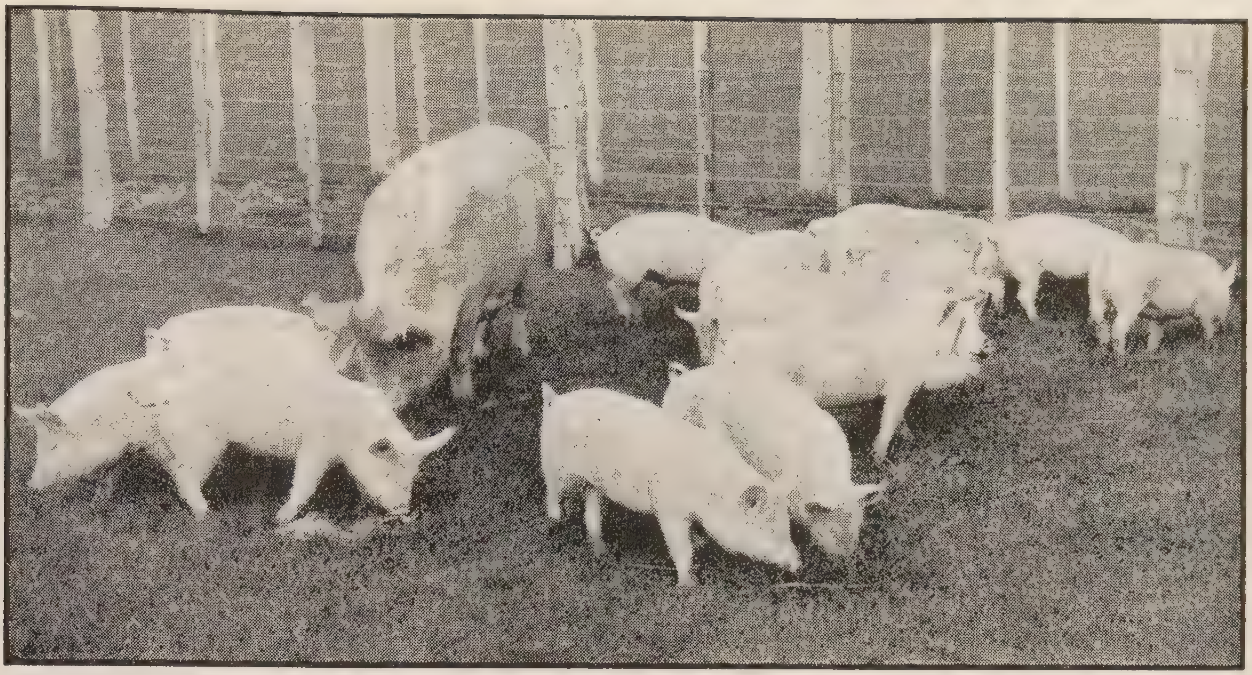
MUCH of the time and labour involved in keeping open drains free from vegetation can be saved by shading the drains with suitable trees, which will completely inhibit aquatic growth. Many farmers have discovered that by accident, but few set out to plant their shelter with that object in view.

ONLY certain species will provide the necessary shade as well as the normal requirements of a good shelter hedge. *Cupressus macrocarpa* appears to be the best for the purpose, but choice of species will depend on local climatic and soil conditions. A single row of macrocarpas is effective if adequately protected from stock to prevent grazing causing the trees to open up near the ground. Topping may be necessary, especially if the trees are placed very close to the drain, to avoid the possibility of their being blown over later in life because of insufficient root hold. They should be planted on the windward side of the drain.

Shading is not the complete answer to drain maintenance, as a certain amount of debris continually falls into the drains from the overhanging trees, but the work of removing this is negligible compared with that required to control growing vegetation.

—*G. L. BANFIELD,*
Assistant Instructor in Agriculture, Thames.

The same drain as in the upper picture unshaded and choked with raupo.



HEADING PHOTOGRAPH

The record-breaking, officially-recorded litter of 15 pigs in the run with their dam at 8 weeks. These pigs weighed 253lb. at 3 weeks and 964lb. at 8 weeks. Individual pigs weighed 52lb. to 80lb., having been fed within an hour of weighing. Photograph by B. Snowden.

THE VALUE OF LITTER RECORDING

LITTER recording is not only useful in helping to select the more efficient producing sows and strains, but is of great importance in focusing attention on factors of management that are fundamental to successful pig raising. In conjunction with the carcass quality evaluation scheme it can form a sound basis for individual breeders to test out the commercial qualities of their purebred stock, and there is much scope for increased use of these schemes by breeders of pedigree pigs. In this article, contributed by the Livestock Division with the co-operation of supervisors of district pig councils, the need for more litter recording and the value of lessons learnt from it are stressed.

IN its early years the National Pig Industry Council decided that litter recording, particularly of the progeny of stock bred by the pig clubs which had then been formed, should be one of the major activities of district pig council supervisors.

This decision was made not because it was believed that litter recording carried out under the varying conditions prevailing on individual farms would be of great value in helping in the selection of breeding stock, but because it was known that, as with herd testing, it focused attention on the importance of management. The potential production of animals cannot be realised until the attention they receive is adequate.

The early pig recording work revealed the weaknesses of bad accommodation, wrong feeding, and inadequate attention on many farms. By finding the means of remedying these weaknesses pig recording, which was based on litter recording, made possible a general improvement in production not only on recording farms, but on all farms where pigs were kept.

The setting of a standard of 40lb. weaners or a total litter weight of 360lb. at 8 weeks has created such interest in sow and litter management that results have been surprising. In the first year of recording only 1 per cent. of litters reached the 40lb. weaner standard; in the third year 56 per cent. had reached it. Today the ideal of the 40lb. weaner is accepted in almost every country in the world.

Exceptional litters have been recorded both unofficially and officially in New Zealand recently. Among the most outstanding are the unofficial record of a pedigree Large White sow which, of a litter of 19 born, reared 17 that reached total litter weights of 236lb. at 3 weeks and 725lb. at 8 weeks and another Large White sow which broke the official record with a litter of 15 reared from 16 born and weighing 253lb. at 3 weeks and 964lb. at 8 weeks. Individual pigs of this litter weighed from 52 to 80lb. at the second weighing under the rules of official recording.

Such results, of course, reflect a very keen interest in all the aspects of management responsible for good litter results, from the feeding and treatment of the breeding sow during pregnancy to the special attention necessary to keep such large litters growing at their top speed.

That good weaners are the foundation of profitable pig-keeping is obvious. They have started feeding from their own trough and suffer little check at weaning, their resistance to disease is high, and, provided the feeding given after weaning is adequate in every respect, economic conversion of food into healthy meat is assured. They command interest and pride of ownership, which in turn result in that better management which is essential to efficiency of production.

Unofficial Records for 1947-48

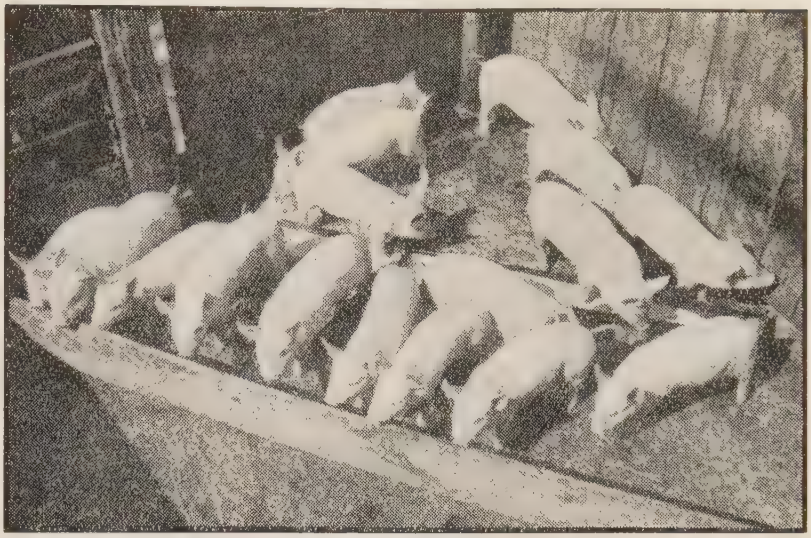
Tables 1 to 5 show records forwarded to the Department of Agriculture during the year ended September 30, 1948, of all litters recorded in that year by district pig council supervisors. Only those litters weighed twice and which had four or more pigs living at the 3-weeks weighing have been included in the tables. Grouping has been carried out on the basis of breed of sow, and some interesting analyses of the 59 litters included are given in Tables 2 to 5. Where the sire or dam of the litter is a

TABLE I—LITTER RECORDS OF SOWS RECORDED BY DISTRICT PIG COUNCIL SUPERVISORS IN 1947-48

Farmer	Date of Birth	Breed and Herd Book No. of Boar	Herd Book No. of Sow	No. of Pigs		Litter weight at		No. of litters born by sow	Losses up to weaning stage				
				Born	Weaned	3wks. lb.	8wks. lb.		Born dead	Overlain	Destroyed	Disease	Other causes
LARGE WHITE SOWS													
C. N. Birks, R.D., Tauranga	31/7/47	B. 21997	6742	10	10	98	333	1	—	—	—	—	—
G. Lawson Adam, Otokia, Otago ..	1/8/47	Berkshire	6630	11	11	111	301	3	—	—	—	—	—
G. Lawson Adam, Otokia, Otago	1/8/47	Berkshire	7017	10	10	85	224	1	—	—	—	—	—
G. Lawson Adam, Otokia, Otago	9/9/47	Berkshire	7020	9	9	75	216	1	—	—	—	—	—
W. Oates, Ayrdale, Hinuera	19/9/47	L.W. 6569	6527	11	9	117	362	*	2	—	—	—	—
W. W. Campbell, South Hillend, R.D., Winton	17/10/47	L.W. 6958	7018	11	9	126	206	1	—	2	—	—	—
I. B. Julian, Kakaramea, Taranaki	14/11/47	L.W. 6961	6943	10	10	98	379	1	—	—	—	—	—
I. B. Julian, Kakaramea, Taranaki	16/11/47	L.W. 6961	6944	10	10	110	370	1	—	—	—	—	—
I. B. Julian, Kakaramea, Taranaki	19/11/47	L.W. 6961	6945	10	10	102	322	1	—	—	—	—	—
I. B. Julian, Kakaramea, Taranaki	20/11/47	L.W. 6961	6942	8	8	101	304	1	—	—	—	—	—
R. Byrne, R.D., Frankton	21/11/47	L.W.		12	11	129	396	*	1	—	—	—	—
R. Byrne, R.D., Frankton	23/11/47	L.W.		10	9	102	345	*	—	1	—	—	—
N.Z. Co-op. Dairy Co., Te Awamutu	7/12/47	L.W.		13	12	168	476	*	1	—	—	—	—
I. B. Julian, Kakaramea, Taranaki	8/12/47	L.W. 6961	6966	12	10	120	370	5	—	2	—	—	—
Te Awamutu Co-op. Dairy Co., Te Awamutu	24/12/47	L.W.	6845	12	12	174	516	*	—	—	—	—	—
G. Lawson Adam, Otokia, Otago	31/1/48	Berkshire	7017	9	9	129	348	2	—	—	—	—	—
G. Lawson Adam, Otokia, Otago	1/2/48	Berkshire	6630	11	11	140	308	4	—	—	—	—	—
G. Lawson Adam, Otokia, Otago	23/2/48	Berkshire	7020	9	9	102	290	2	—	—	—	—	—
Boys' High School, New Plymouth	3/7/48	L.W. 7261	7287	15	9	123	355	3	—	4	—	—	2
BERKSHIRE SOWS													
N.Z. Co-op. Dairy Coy., Te Awamutu	3/10/47	L.W. 7310		12	10	117	387	*	—	2	—	—	—
E. R. Wilson, Okaiawa, Taranaki	27/11/47	B. 21672	21852	8	7	71	208	3	—	1	—	—	—
P. McD. McClean, R.D., Te Kuiti .	10/12/47	L.W.		10	9	103	353	*	—	1	—	—	—
E. R. Wilson, Okaiawa, Taranaki	25/12/47	B. 21778	21111	12	10	122	292	3	2	—	—	—	—
McDonald and Hollay, R.D., Whakatane	13/1/48	L.B. 4910	22477	7	7	56	221	3	—	—	—	—	—
Greenmeadows Mission, Hastings	6/5/48	Tamworth	21053	12	11	135	400	4	—	—	1	—	—
Greenmeadows Mission, Hastings	6/5/48	Tamworth	21052	12	11	155	447	4	—	—	1	—	—
A. W. Revell, Mangatoki	15/5/48	B. 22934	22262	9	8	133	334	1	—	1	—	—	—
A. W. Revell, Mangatoki	26/5/48	B. 22934	20907	14	9	148	390	5	2	3	—	—	—
R. K. Hepburn, Manutuke	2/6/48	B. 21250	21118	10	10	130	373	6	—	—	—	—	—
TAMWORTH SOWS													
H. Jones, Kiwitahi, Morrinsville	17/9/47	Ped. B.		10	9	115	353	*	1	—	—	—	—
G. Preece, Okaiawa, Taranaki	22/11/47	T. 15038	14563	12	9	109	350	2	—	3	—	—	—
G. Preece, Okaiawa, Taranaki	7/12/47	T. 15227	14964	8	8	132	313	4	—	—	—	—	—
G. Preece, Okaiawa, Taranaki	4/1/48	T. 15856	15714	14	7	56	209	2	4	1	2	—	—
R. Haultain, Horsham Downs, Hamilton	6/1/48	Ped. B.		9	9	98	342	*	—	—	—	—	—
G. Preece, Okaiawa, Taranaki	7/1/48	T. 15856	15808	10	7	65	209	1	—	3	—	—	—
G. Preece, Okaiawa, Taranaki	14/1/48	T. 15856	15714	11	9	45	176	1	1	1	—	—	—
G. Preece, Okaiawa, Taranaki	17/1/48	T. 15856	15715	11	7	85	267	2	2	2	—	—	—
J. T. Herbert, Bushmere, Gisborne	11/2/48	L.W.		10	9	131	355	1	—	1	—	—	—
G. Preece, Okaiawa, Taranaki	24/2/48	T. 15856	14556	15	6	77	167	6	5	4	—	—	—
G. Preece, Okaiawa, Taranaki	29/2/48	T. 14694	14557	15	5	53	150	6	4	—	2	—	4
G. Preece, Okaiawa, Taranaki	13/4/48	T. 14694	13410	8	4	61 (5)†	109	9	2	1	—	—	1
G. Preece, Okaiawa, Taranaki	8/5/48	T. 14694	14336	8	3	50 (4)†	120	7	—	4	—	—	1
G. Preece, Okaiawa, Taranaki	12/5/48	T. 14694	14563	9	6	86	261	4	—	3	—	—	—
G. Preece, Okaiawa, Taranaki	23/5/48	T.14694	15984	8	7	55	196	1	—	1	—	—	—
G. Preece, Okaiawa, Taranaki	30/5/48	T.14694	14964	12	7	78 (8)†	210	5	—	4	—	—	1
G. Preece, Okaiawa, Taranaki	11/6/48	T.14694	16109	10	7	80	168	1	—	3	—	—	—
Warea Pig Club, Warea, Taranaki	15/6/48	T. 15962	15912	11	10	100	309	1	—	1	—	—	—
G. Preece, Okaiawa, Taranaki	9/7/48	T. 14694	15714	14	6	75 (7)†	141	3	—	7	—	1	—
G. Preece, Okaiawa, Taranaki	19/7/48	T. 14694	15715	12	6	81	154	3	2	4	—	—	—
G. Preece, Okaiawa, Taranaki	20/7/48	T. 14694		9	4	44 (5)†	84	1	—	4	—	1	—
LARGE BLACK SOWS													
D. Bruce, Horsham Downs, Hamilton	4/7/47	L.W. 6873		11	10	115	386	*	—	1	—	—	—
McDonald and Hollay, R.D., Whakatane ..	28/7/47	L.B. 4910	L.B.x	10	7	75	155	6	—	2	—	—	1
G. Vasta, R.D., Whakatane	11/9/47	B. 20808		9	7	73	227	8	—	—	—	—	2
CROSSBRED SOWS													
J. McClean, Te Kawa	27/8/47	L.W. 6999		11	11	138	364	*	—	—	—	—	—
T. W. Sewell, Patutahi, Gisborne ..	26/11/47	L.W.	T.B.x	9	9	160	455	6	—	—	—	—	—
J. McClean, Te Kawa	2/12/47	L.W. 6999		8	7	110 (8)†	301	*	—	—	—	1	—
T. W. Sewell, Patutahi, Gisborne	6/12/47	L.W.	T.B.x	12	7	96 (10)†	200	5	—	3	2	—	—
G. Lawson Adam, Otokia, Otago	20/12/47	Berkshire	B.L.W.x	7	7	88	178	2	—	—	—	—	—
G. Lawson Adam, Otokia, Otago	9/6/48	Berkshire	B.L.W.x	13	10	97	334	3	3	—	—	—	—
								Totals	32	70	8	3	12

* Not known.

† The number in parentheses indicates the number of pigs there were in the litter when it was weighed at 3 weeks.



The pedigree Large White litter of 17 pigs reared which weighed 236lb. at 3 weeks and 725lb. at 8 weeks under unofficial recording.

registered animal the Herd Book number is given in Table 1 if it is known.

It is disappointing to note that the proportion of litters exceeding the 40lb. weaner standard has fallen to just over 10 per cent., though as many more miss this standard by only a very small margin. Compared with the position when 56 per cent. of litters recorded under the pig recording clubs reached the 40lb. weaner standard, this is not very creditable. It probably reflects the tendency to pay less attention to pigs under present conditions on many farms.

As shown in Table 1, the number of losses of pigs up to the weaning stage was 125. The total number of pigs born was 625, so the percentage of losses was 20. However, more than half these losses occurred on one farm, and if the figures for that farm, on which 42 per cent. of the pigs born (186) were lost, are not included in the record, the production of the remaining farms is shown up more favourably, as the total losses up to the weaning stage on these farms, where 439 pigs were born in recorded litters, were only 47 or less than 11 per cent.

Breed Comparisons

The piglet and total litter weights at 3 weeks and 8 weeks are tabulated on a breed basis in Table 2, which confirms the general impression to be gained from Table 1 that the number of pigs weaned in the litter is an important feature in securing a high total litter weight. It is, of course, a composite factor, its components being high prolificacy of the sow on the one hand and her mothering qualities and the standard of attention given her on the other.

TABLE 2—COMPARISON OF LITTER WEIGHTS BY BREED OF PIG

Breed	No. of litters	Weight at 3 weeks per pig lb.	Weight at 3 weeks litter lb.	Weight at 8 weeks per pig lb.	Weight at 8 weeks litter lb.
L. White	19	11.75	116	34.7	343
Berkshire	10	12.7	117	37.0	340
Tamworth	21	11.2	80	32.0	221
L. Black	3	11.0	88	34.0	256
Crossbred	6	12.5	115	35.9	305
	59	11.8	102	34.3	291

It has become accepted as a standard that the 8-weeks weight should be three times the 3-weeks weight and where, as in the case of this group of records, this standard is not achieved it is the fault of management rather than of the productive capacity of the stock. Tamworths in the group were just as prolific as Large Whites, but, because of much heavier losses, failed to show up well in litter weights (see Table 3). Whether these losses could properly be debited to the stock because of poor mothering temperament, health, or other factors or to management is a matter which requires further investigation on the farms concerned.

TABLE 3—PERCENTAGE OF LOSSES OF TOTAL PIGS BORN

Breed	Total pigs Born	Total pigs Weaned	Losses per cent. of total born
Tamworth ..	226	145	35.8
Large White	203	188	7.4
Berkshire ..	106	92	13.2
Crossbred ..	60	51	15.0
Large Black	30	24	20.0
Totals ..	625	500	Average 20

[B. Snowden photo.

The record official litter at weaning.

Importance of Large Litters

It has been emphasised on many occasions that under good management large litters can attain as good average weights as moderate or small litters. This is strikingly illustrated in Table 4 and emphasises the part management has played.

TABLE 4—RELATION OF NUMBER WEANED TO FINAL LITTER WEIGHT (8 weeks)

No. of pigs weaned	No. of litters	Average total weight lb.	Average weight per pig lb.
12 ..	2	496	41.3
11 ..	6	369	33.5
10 ..	12	340	34.0
9 ..	15	333	37.0
8 ..	3	317	39.6
7 ..	13	211	30.1
6 ..	4	181	30.2
5 ..	1	150	30.0
4 ..	2	97	24.3
3 ..	1	120	40.0

Table 5 shows that increasing prolificacy up to 13 born in the litter is associated with increased total weight.

THE VALUE OF LITTER RECORDING . . .

Because of heavy losses in litters larger than this it is doubtful whether greater prolificacy is desirable unless the standard of management is superb.

TABLE 5—RELATION OF NUMBER BORN TO FINAL LITTER WEIGHT

(8 weeks)

No. of pigs born		No. of litters	Total litter weight (average) lb.	Average weight per pig lb.	Average number weaned
15	..	3	224	33.6	6.7
14	..	3	247	33.6	7.3
13	..	2	405	36.8	11.0
12	..	11	338	35.8	9.5
11	..	9	309	31.9	9.7
10	..	13	280	31.1	9.0
9	..	9	284	36.5	7.8
8	..	7	222	35.3	6.3
7	..	2	200	28.5	7.0

Grading of the Litters

The five grades used for the classification of recorded litters are:—

Grade		Litter weight at	
		3 weeks lb.	8 weeks lb.
1	.. .. ..	120	360
2	.. .. ..	100	300
3	.. .. ..	90	270
4	.. .. ..	80	240
5	.. .. ..	70	210

Of the 59 litters analysed in Table 1, 43 or almost 73 per cent. were good enough to be included in one of the above grades. Thirty-six of the litters, or 61 per cent., were classified in one of the first three grades. This compares favourably with the position under official recording of pedigree sows, where over the past 12 years only two-thirds of the total have been included in any grade and only one-third reached the top three grades. If it is assumed that management in pedigree herds is on the average better than in commercial herds, the comparison between the gradings of the pedigree sows and those of the commercial sows does not reflect favourably on the performances of the pedigree pigs. If these are to carry out their true function of improving the pig stock of the Dominion, they must be capable of producing better litters than average commercial sows. Though pedigree sows themselves form a large proportion of those pigs whose records are analysed in this article, only the Large White and Berkshire purebreds show up favourably against the crossbred sows.

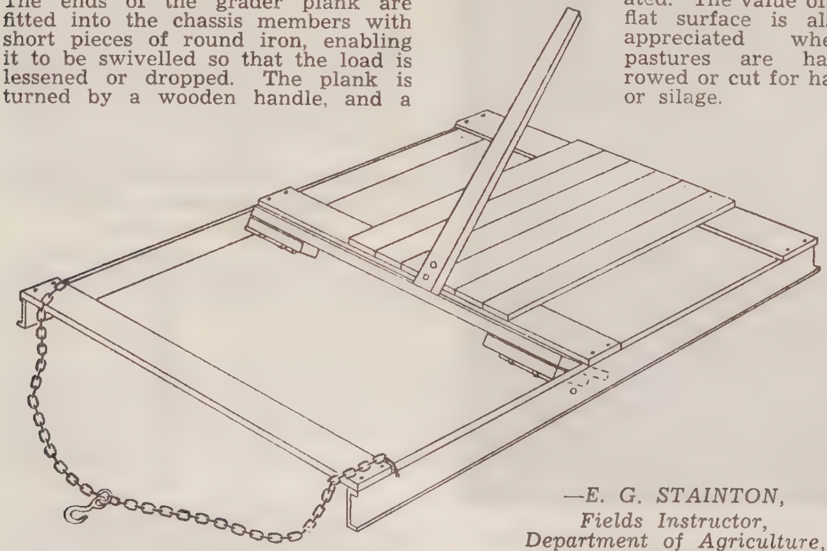
* * *

A Farm-made Land Leveller

THE working down of rough land such as recently-drained swamp and dry, potholed, ploughable country to a level surface is receiving more attention from farmers each year when the land is cultivated before being laid down to permanent pasture. For this work a suitable leveller or grader is necessary, and Mr. T. Fallon, of Owhango, South Auckland, has made a very effective one from the two main members of an old car chassis, three 6in. x 2in. planks 10ft. long, a grader plank 12in. x 3in., and an old road-grader blade 4in. x ½in., sharpened and fitted to the plank for its full length to make a cutting edge. The ends of the grader plank are fitted into the chassis members with short pieces of round iron, enabling it to be swivelled so that the load is lessened or dropped. The plank is turned by a wooden handle, and a platform for the operator to stand on is an advantage.

This implement is about 10ft. square, so a tractor of not less than 23 drawbar horsepower is necessary to pull it, as several tons of earth are pushed off a knob of ground at a time. For a smaller tractor the width of the grader must be reduced, but the length should be retained, as a long implement has been found to straddle ground depressions and make a better job.

When land is levelled it gives an even grazing surface for stock, and dry knobs and wet holes are eliminated. The value of a flat surface is also appreciated when pastures are harrowed or cut for hay or silage.



—E. G. STAINTON,
Fields Instructor,
Department of Agriculture,
Taumarunui.

Show Dates

THE following are dates and venues of A. and P. shows in December, January, and part of February.

November 30 and December 1—Otago A. and P. at Dunedin.
December 3—South Otago A. and P. at Balclutha.
December 4—Winton A. and P. at Winton.
December 4—Hauraki A. and P. at Paeroa.
December 4—Tokomairiro A. and P. at Milton.
December 4—Whangaroa A. and P. at Kaeo.
December 7 and 8—Gore A. and P. at Gore.
December 11—Wyndham A. and P. at Wyndham.
December 14, 15, and 16—Southland A. and P. at Invercargill (Royal Show).
December 18—Otago Peninsula A. and P. at Portobello.
January 1—Nuhaka A. and P. at Nuhaka.
January 8—Blueskin A. and P. at Waitati.
January 14 and 15—Wairoa County A. and P. at Wairoa.
January 15—Waiau A. and P. at Tuatapere.
January 15—Waikouaiti A. and P. at Waikouaiti.
January 21—Palmerston and Waihemo A. and P. at Palmerston.
January 22—Waipukurau A. and P. at Waipukurau.
January 26—Marton District A. and P. at Marton.
January 28 and 29—Horowhenua A. and P. at Levin.
January 28 and 29—Taumarunui and District A. and P. at Taumarunui.
January 29—Tauranga A. and P. at Tauranga.
January 29—Helensville A. and P. at Helensville.
February 1 and 2—Feilding I. A. and P. at Feilding.
February 3 and 4—Feilding Ram Fair at Feilding.
February 5—Clevedon A. and P. at Clevedon.
February 5—Rodney Agricultural Society at Warkworth.
February 5—Woodville A. and P. at Woodville.
February 5—Golden Bay A. and P. at Takaka.
February 5—Hukerenui A. and P. at Hukerenui.
February 8 and 9—Dannevirke District A. and P. at Dannevirke.
February 10—Dannevirke Ram Fair at Dannevirke.
February 11 and 12—Taranaki A. and P. at New Plymouth.
February 11 and 12—Auckland A. and P. at Auckland.
February 11 and 12—Rangitikei A. and P. at Taihape.

EFFECT OF ROOF COLOUR ON HIVE TEMPERATURES

THE colour of hive roofs is a subject that in the past has received only minor attention from beekeepers, but trials indicate that the colour of paint used for preserving roofs has a considerable effect on the interior temperature of hives. The results of these trials and the conclusions to be drawn from them are given in this article by D. S. Robinson, Apiary Instructor, Department of Agriculture, Hastings.

SINGLE-STOREY empty hives of uniform construction were used for the trials. All hives and roofs were made with ⅞in. timber, with telescopic roofs covered with flat iron. The location chosen was an open space unaffected by shade or shadows from trees. Hives were well spaced to prevent one being shaded or protected by another.

The paint used was commercial exterior paint and the colours were those that may be seen in apiaries—aluminium, deep olive green, cream, black, white, and pillar-box red.

All temperatures were taken on days free from wind, with varying degrees of sunshine.

Method of Taking Temperatures

On each day when temperatures were taken the hives were placed in position with entrances fully closed. The roofs were removed and laid behind the hives, paint side down, and left for 30 minutes to ensure all hives and roofs being of even temperature.

A thermometer was placed in each hive, the roofs replaced, the hives left for 1½ hours, and temperature readings taken. The roofs were replaced as each temperature was taken and left for a further 30 minutes. The thermometers were then read again, and if the temperature was no higher than at the first reading, the results were recorded. A summary of temperatures taken on eight occasions is given in the table below. The order in which the hives appear in the table is that in which they were placed in the line in the paddock.

The six hives used for the experiment. The colours of the roofs, from left, are aluminium, green, cream, black, white, and red.

Choice Depends on Locality

As roofs painted green, black, or red keep the hives warmest, these colours might be adopted in the cooler districts. Aluminium, cream, and white are more suitable for the warmer localities.

Assistance given bees to maintain an even hive temperature in winter, within reasonable limits, means a saving in hive stores. Likewise, any help that can be given to control the hive temperature in the hotter months lessens the number of bees required to "fan" and provides an extra field force for the collection of nectar. The maintenance of too high a hive temperature during winter would induce too much colony activity, followed by greater consumption of stores.

In some localities it is desirable to check colony activity somewhat in late autumn and early spring—in autumn to conserve stores, and in early spring to conserve stores and colony energy, including that of the queen, and prevent colonies reaching their peak before the honey flow starts. The ideal would be interchangeable roofs of various colours—green, black, or red to provide warmth when required, and cream, white, or aluminium for the opposite effect—but that would be impracticable on the score of expense and labour. Therefore the situation can best be met by the adoption of the colour shown to be most suitable to the locality.

There is no doubt that the thickness of the timber used in the construction of hives affects the interior temperature. For instance, a hive with a roof of very thin timber would be subject to a wide range of temperatures, which would not be affected greatly by the colour of the roof. The figures given are based on the thickness of timber used by the large majority of beekeepers for the construction of hives—⅞ to 1in.

From the results of the experiment apiarists should be able to select the colour most suitable for hive roofs in their districts. In the past most apiarists have painted their hive roofs only for protection from the weather, but it is recommended that consideration be given to the effect of roof colour on hive temperature.

Colour of hive roof	Temperature of Interior (degrees F.)									Order of warmth
	February	March	April	April	May	June	July	December	Average	
Aluminium ..	90.5	91	80	75.5	59.5	70	53	95	76.8	4th
Green ..	97	94.5	94	80.5	60	73	54.5	99.5	81.6	1st
Cream ..	89	91	84.5	77	59	70.5	52	91	76.7	5th
Black ..	96.5	93	89	80	61	71	54	97	80.2	2nd
White ..	90	86	83	76	59	70	53	93.5	76.3	6th
Red ..	93	90	85.5	78	61.5	69.5	54.5	96.5	78.6	3rd
Air temperature at ground level	82	78	75.5	69	57	59	50	85.5	69.5	

MOULD FOR MAKING CONCRETE PIPES

By A. J. KERSE, Fields Instructor,
Department of Agriculture, Auckland.

THE mould for the making of concrete pipes for crossings which is described in this article was seen at Mr. J. B. Armstrong's property in Kolmar Road, Papatoetoe. It makes a very solid 9in. pipe 3ft. long, and if the mixture is right and the tamping is done thoroughly, the pipes appear to be sufficiently strong without any reinforcing to make really good farm crossings.

THE outside and inside casings of the mould are made of sheet metal and are controlled by three rings on the outside casing and two rings on the inside casing.

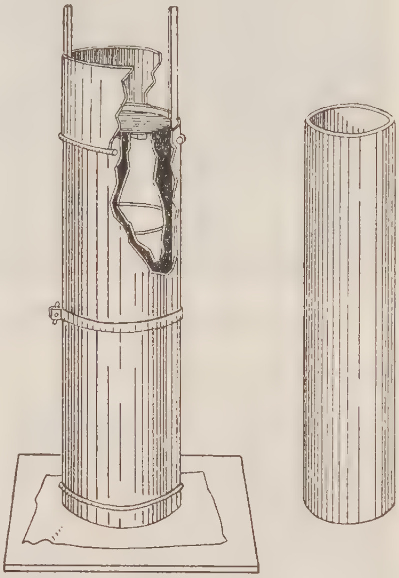
Construction of Mould

To make the casings a sheet of 20-gauge flat steel 6ft. by 3ft. is required, and this is cut as shown in the accompanying diagram. Piece A, when rolled, becomes the outside form and will have an overlap of 1½in. to 2in. Piece B becomes the inside form and, when rolled, will have an overlap of at least 2in. Piece C is surplus.

The rings are made of ⅜in. round iron. Two of the outside rings are 11in. in diameter, inside measurement, and the third is in the form of a band with a thumb-screw so that it can be loosened and slipped on and off easily. The inside rings are 8½in. in diameter, outside measurement, and there are only two of these. It is necessary to have the sheet metal rolled in a rolling machine to give the necessary shape and to give the outside sheet spring outward and the inside sheet spring inward.

Assembly and Operation

The method of assembly and operation of the mould, which is illustrated below, is as follows:—



Assembly of the mould and a cast pipe.

Both the inside and outside sheets are oiled on the sides which will be next to the mixture. The outside casing is laid down and pressed together so that the three rings can be fitted, the two end rings being put on about 3in. from the ends. The inside sheet is then done in the same way, except that the two rings are put inside the casing. The inside piece is then stood up on a level platform, and it is advisable to put a sheet of newspaper between the platform and the casing to prevent the mixture sticking to the platform. The outside casing is put over the inside casing and three 1⅛in. pieces of round dowelling are put down between the two casings. This gives the necessary space between the casings for the concrete mixture, and the dowellings are withdrawn upward as the filling is tamped down. The dowels should be about 3ft. 6in. long so that there is sufficient projecting beyond the mould to afford a grip when the dowels are being withdrawn during filling of the mould.

To prevent the filling going down the centre of the inside casing a lid made of a piece of iron sheet metal with a wooden cross on the lower side so that it does not shift about must be provided over the inside casing.

In addition a hopper, also made from a piece of sheet metal, is fitted above the outside casing so that it rests on the top ring. If the hopper is made from the 6in. piece over from the original 6ft. sheet of metal, it will hold a shovelful of mixture which can be worked down into the spaces between the two casings.

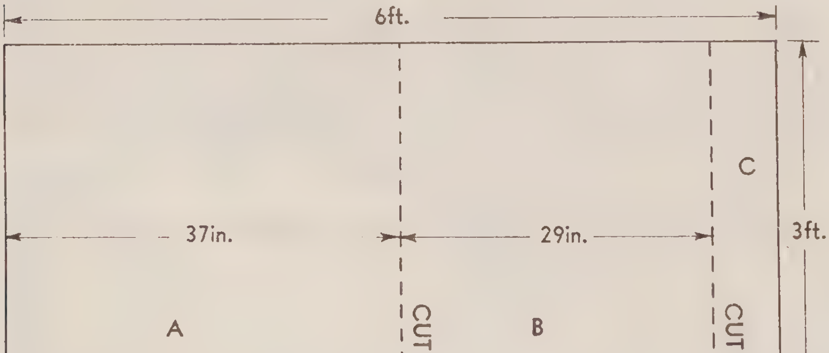
The mixture recommended is 1 of cement, 2 of sand, and 4 of fine metal chips, by volume.

The tamping is done with a ½in. iron rod and care must be taken to withdraw the dowels gradually so that they maintain the space correctly and at the same time do not become fixed in the mixture. Tamping should not be too severe or the mould will be distorted.

As there is a tendency in tamping the bottom end of the pipe to work the bigger metal to the bottom and to form a rough finish, it is advisable to prepare a small quantity of a good, strong mixture of cement and sand which may be put in the mould first to give a smooth finish to the bottom end of the pipe. The top end presents no difficulties, as this finishes off very well with the ordinary tamping.

Removal of Mould

The pipe should not be taken from the mould until about 12 hours after pouring of the mixture. To remove the mould the inside rings are knocked out carefully and the inside piece will then come out easily. The mould is then laid down and one of the outside rings is tapped off carefully; then the mould is stood up again, the centre band is loosened and slipped off, and then the bottom ring knocked off carefully. The outside casing, if it has been properly oiled, should come away quite freely. The pipe is then left to cure, a process which is helped by keeping the pipe moist for from 7 to 10 days.



Sheet of 20-gauge flat steel marked out for the cutting of the casings.

BLOWFLY STRIKE IN SHEEP

Blowfly strike in sheep can cause serious loss. Bulletin No. 192, "Blowfly Strike in Sheep," which deals fully with the subject, is available free from any office of the Department of Agriculture.

Career Opportunities in the Department of Agriculture

EACH year at about this time the personnel section of the Department of Agriculture receives many inquiries from people interested in obtaining employment after the university and school examinations. The Department would prefer that these people be interviewed before they start their studies, for then the personnel section would be better able to advise them of the subjects and examinations which are most useful when seeking an appointment.

THE Department of Agriculture, not only one of the largest under commission control but also the one which serves the most extensive and important industries of New Zealand, offers ample opportunities for graduates, science students, and clerical cadets, male or female. The scope for advancement and for the building of a career is wide and varied, and departmental training schemes ensure that ability is developed.

Research and Instruction

Animal research: More than 90 per cent. of New Zealand's total exports are of animal origin; hence the importance of providing the farmer with the latest information on animal breeding, nutrition, and husbandry. In obtaining this information research plays a vital part, and it is on this work that graduates, mainly in science, are employed. Animal research is carried out at two large laboratories, at Wallaceville and Ruakura. Wallaceville, about 20 miles north of Wellington, on 100 acres of land, concentrates on the investigation of animal diseases. Ruakura, 3 miles from Hamilton, and with 1000 acres of excellent pasture land carrying 600 cattle, 2000 ewes, and 200 sows, concentrates more on animal breeding, feeding, and general management. Both are excellently equipped with the most up-to-date apparatus available, and here many people find interesting work of a type stimulating individual effort and requiring independent thought.

Pasture and soil research: In the same way as the Animal Research Stations work on the products of pastures, the Soil Fertility Research Station works on the soil and its products. Situated on about 60 acres of land at Rukuhia, about 3 miles from Hamilton, this laboratory, a relatively-new unit, is concerned primarily with research into soil fertility and the maintenance and improvement of pastures and crops. A wide variety of interesting work is undertaken with modern facilities and equipment.

Instruction and extension work: From the laboratories and research stations information passes to instruction and extension staff for test and development. An interesting project, more in the nature of an experimental farm, is the Winchmore Irrigation Station. It is about 7 miles from Ashburton and situated on 750 acres of land.

Instruction in the field: Many graduates are employed on this work, the educational qualification being B.Ag.Sc. These officers keep very close touch with the farmers in their districts and pass on to them the latest advice and information, more generally in relation to pasture and crop management. Theirs is purely a field job, and their designation, Instructor in Agriculture, gives a good indication of their work.

Horticulture: Another specialised line of instruction is found in the Horticulture Division, where general instruction in horticulture and apiculture requires qualified officers, preferably with the degree of B.Sc.

Salaries and Bursaries

Starting points for salaries are B.Sc. from £350 a year, B.Ag.Sc. from £375, then up to £425 for M.Ag.Sc. with first-class honours. Promotion proceeds by annual increments up to £585, but from there on it is by merit. To the officer with ability, advancement beyond this point is almost assured, more than 50 positions carrying higher salaries.

Full-time bursaries for science students are being offered by the Department to young people who have passed the university entrance examination. Selected students from those who pass a special bursary examination will receive £70 a university year, plus £40 board allowance if away from home. During the long vacation they will be employed in the Department on the work for which they are being trained.

A limited number of additional bursaries is offered to officers whose work and academic records show promise and who wish to take a master's degree. These bursaries are reviewed annually, but are being offered for next year on the basis of leave on full pay, together with college and class fees and a book allowance.

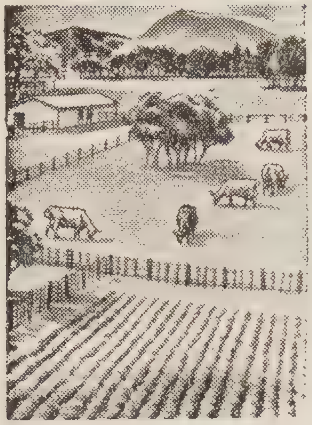
General Management

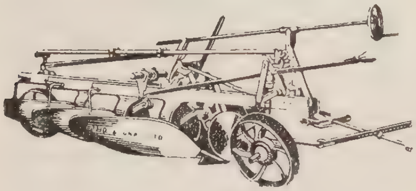
The Clerical Division's function is mainly general management, assisting executive and administrative officers. The Department has not only a large accounting responsibility but also the usual type of organisational work, such as correspondence, statistics, machine accounting, and typing. The Division has a comprehensive staff-training scheme in which one of the main objectives is to place people on work in which they are most interested. Numerous positions in the Division call for executive and administrative ability.

All inquiries should be addressed to the Personnel Officer, Department of Agriculture, P.O. Box 3004, Wellington.

Staff Vacancies to be Filled

LOCATION	EDUCATIONAL QUALIFICATIONS	TYPE OF WORK
	Graduates	
Animal Research Station, Wallaceville	B.V.Sc. or B.Ag. Sc. B.Sc. (Chem.) B.Sc. (Zoology)	Bacteriology and Parasitology Research in trace elements Histology work
Animal Research Station, Ruakura	M.Ag.Sc. M.Ag.Sc. or V.Sc. B.Sc. (Zoology) M.Sc. or B.Sc. (Chem.) M.Sc. or B.Sc. (Chem.)	Milk-secretion studies Sheep-nutrition work Physiology of reproduction Metabolism chemistry on nutrition work Photosensitivity studies
Dairy Division, Wallaceville	B.Sc. (Chem.)	Dairy chemistry
Winchmore Irrigation Station, Ashburton	M.Sc. (Physics) B.Ag.Sc. or B.Sc.	Research in moisture content of soils and physical chemistry on irrigation Irrigation investigations and general research
Soil Fertility Research Station, Hamilton	B.Sc. (Chem.) B.Ag.Sc.	Fertiliser and soil analysis Lime and fertiliser responses
Timaru, Invercargill, Dunedin, Rangiora, Wellington	B.Ag.Sc.	General field instruction
Horticulture, Auckland, Wellington and sundry	B.Sc. (Zoology) B.Sc. (Botany) or B. Ag. Sc.	Beekeeping instruction General instruction and research in horticulture
	Clerical Cadets	
Auckland, Ashburton, Palmerston North, Christchurch, Dunedin, Invercargill, Hamilton, Ruakura, Hastings, New Plymouth, Timaru, Wellington	School Certificate, University Entrance, or equivalent time at secondary school	Records, accountancy, livestock brand registration, seed certification, and general office routine. Cadets obtain specialised departmental training
Wellington (machinists)	Departmental training provided	Powers-Samas machines and Addressograph doing office work
Wellington and other main centres		Typists and shorthand typists





The Changing Face of New Zealand—3

From untrodden timberlands and forest to productive fertile farmlands—that was the task early New Zealand farmers faced and successfully accomplished—thanks to hard work, courage, and perseverance . . . and sturdy, dependable ploughs! As far back as 1868 R. & G. Ploughs were giving faithful service to New Zealand farmers—earning an outstanding reputation for quality, for dependability, and efficiency whatever the conditions. Today R. & G. Ploughs are finer than ever . . . a special type made for every type of land surface . . . and all made for years of trouble-free performance.

REID & GRAY LTD.

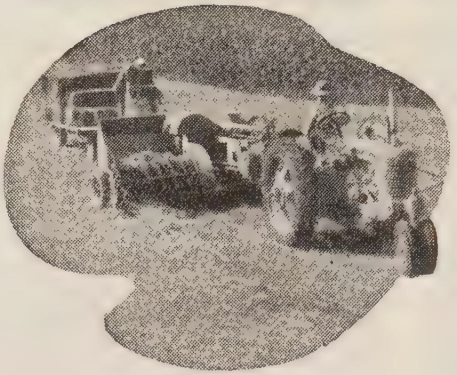
Head Office and Works:

BURNSIDE, OTAGO.

Branches at

INVERCARGILL, GORE and BALCLUTHA.

AGENTS—**Auckland:** Alfred Buckland & Sons Ltd. **Hamilton:** A. M. Bisley & Co. Ltd. **Gisborne.** Machinery Exchange Agency. **Hastings:** Bull and Hodgkins. **Palmerston North:** Reid & Gray Agency Co. Ltd. **New Plymouth:** J. B. MacEwan & Co. Ltd. **Masterton, Nelson, Wellington:** Levin & Co. Ltd. **Blenheim:** R. Cresswell & Sons Ltd. **Christchurch, Ashburton, Timaru, Oamaru. Waimate:** National Mortgage & Agency Co. of N.Z. Ltd.



BETTER HAY

Less Labour Less Cost

With Case mowers, rakes, and Sliced-Hay Pick-Up balers you are equipped to get better feed from your haylands at lower cost. These modern machines work fast when the crop is at its peak in quality. The hay is quickly mowed . . . raked into even-curing windrows . . . put into wire-tied sliced bales which save quality yet open easily at feeding time.

Distributors:

JOHN CHAMBERS & SON LTD.,
Sole N.Z. Agents.

Auckland, Wellington, Christchurch,
Dunedin, Invercargill, Timaru,
New Plymouth, Ashburton, Hamilton,
Palmerston North.

CASE

Kills weeds in pastures "AGROXONE"

✻ THE MOST ECONOMICAL HORMONE WEED KILLER

Recommended for the Following: Control of Californian Thistle, Variegated Thistle, Nodding and Winged Thistle, Scotch and Sow Thistle, Convolvulus, Hemlock, Fennel, Shepherd's Purse, Storksbill, Ragwort, Buttercups, Docks, Fat Hen. Californian Thistle for most satisfactory control should be sprayed two or three weeks, or later, before flowering. "Agroxone" being water soluble, no difficulty is experienced in cleaning out spray equipment—ten clear changes of water are recommended.

LIQUID PRICES:

40 gallon drums - 17/10 per gal
4 gallon tins—24 gallons and over 19/8 per gal. Less than 24 gallons 22/8 per gal.
Dust Prices and smaller quantity liquid on application.

IMPERIAL CHEMICAL INDUSTRIES (N.Z.) Ltd.

P.O. Box 990 - WELLINGTON
P.O. Box 900 - AUCKLAND

Available from seed merchants and stock and station agents

BRITISH HORMONE ICI WEED KILLER

BRITAIN'S ECONOMIC POSITION STILL CRITICAL

Greater Production of Food in Dominion Imperative

A WARNING that unless Britain could pay her own way by 1952-53, when Marshall Aid ceased, the standard of living in New Zealand would be jeopardised was given by Mr. F. P. Walsh, chairman of the Aid for Britain National Council, in two statements issued recently. In these Mr. Walsh drew attention to the fact that, despite what had been achieved in little more than a year, Britain's economic position still remained critical and he stressed the need for greater production of food and a sustained effort by the Dominion in supporting Britain. The two statements, the first of which is a survey of Britain's trade and economic position at present and the second a review of the first year's work of the Aid for Britain National Council in directing the Dominion's campaign to give Britain every assistance possible, are printed below.

"AT intervals cables are published in our Press which deal with Britain's export figures for individual months, quarters, etc., and these show a very marked increase in export volume combined equally with a reduction in imports," said Mr. Walsh. "It would be possible from these cables to get a false picture of Britain's real position. It is true that her exports have expanded tremendously since the end of the war. The amazing efforts of her workers and producers have resulted in an actual increase in the first half of this year of 30 per cent. above the volume of total production for the first half of 1938. 'By the end of June, 1948,' said Sir Stafford Cripps in the House of Commons on September 16, 'the volume of exports had almost certainly hit the target figure of 140 per cent. of pre-war, a figure which has since been well exceeded.' But it is also true that the terms of trade have moved so far and so fast against Britain that the increases in export volume have not enabled her to pay for what she needs to feed and clothe her producers and to buy the raw materials they need to maintain their production.

"The trade gap between what she sold overseas and what she needed to buy to keep going in the first six months of 1948 was £156 million, £69 million more than had been forecast; and in spite of a magnificent improvement in invisible receipts which gave a surplus of £16 million on invisible items, the total gap was £140 million for the six months.

Marshall Aid during the Next 12 Months

"Marshall Aid to the United Kingdom for the year July, 1948, to June, 1949, is $1263 million and should cover the sterling area's dollar deficit if present economies and export efforts are maintained. But against this substantial figure of United States aid to the United Kingdom must be set the very considerable aid that Britain will have to give Europe; $282 million of the dollar aid will be given to the United Kingdom only on condition that she makes an equivalent amount of sterling available to deficit countries of Europe. In addition, she has agreed to allow those countries to draw down their sterling balances by the equivalent of $218 million. Britain, with or without assistance from the sterling area, will therefore be pouring $500 million of unrequited exports into Europe in the 12 months up to the end of June, 1949. She will pass on to Europe approximately 40 per cent. of the United States aid.

"In the first annual programme of Marshall Aid to Europe Britain can expect her overall balance of payments to be relieved not by $1263 million or £313.4 million, but by $763 million or £189.3 million. The total gap for the first half of 1948 was at the annual rate of £280 million. In the next full year this deficit must be reduced to less than £190 million.

The Four-year Plan

"Even during this first year, therefore, tremendous efforts must be made to keep the payments gap to the net amount of aid which the United Kingdom will receive under the Marshall Plan, and the following years will show greater difficulties. If Congress will continue to support the present programme, there is a chance that Britain, with help from other members of the Commonwealth and in co-operation with the countries of Western Europe, will be able to balance her payments over the next four years without any reduction in her present standard of living. The prospect is at best precarious. Without American aid it would clearly be impossible.

"But every year the dependence on this aid must lessen and at the end of the fourth year, 1951-52, Britain must be able to pay her own way. The British are at present drafting a four-year plan setting out the measures they must take to be able to do without Marshall Aid by 1952-53. By then they will have to pay for everything or go without. If payments are balanced at the present rate of exports, the standard of living must fall. A substantial increase in exports will be needed before any increase in the present meagre standard is possible. It cannot be done unless sufficient improvement is made not only in the United Kingdom's balance of payments, but also and especially in the whole sterling area's balance with the Western Hemisphere.

"The basic principles of this plan must be:—

(a) To continue austerity measures to enable investment schemes to be carried out both in the United Kingdom and overseas without adding to the potential inflation and to the difficulty of balancing payments.

(b) To intensify the energetic and even uncomfortable measures now being made to increase and reorganise production and to increase exports.

(c) To seek more supplies from non-dollar sources, especially the sterling area, so that dependence on imports from the dollar area may be reduced.

(d) To seek the continuation of all these measures in the rest of the sterling area.

Implications for New Zealand

"The political and security implications of this great project add to its economic importance—on its success depend the future standards of living and happiness of a great part of the world. The last year has shown the importance of the dollar problem to New Zealand and its solution can come only from facing up to the problem in these next few years. At the moment we are sending to Britain goods which we could sell for the dollars we need to buy goods which Britain cannot supply. But even now with world shortages and high prices we would not be able to import much more, for every ton diverted from Britain would leave less sterling to pay for imports from Britain. The gain would be slight and it would, of course, be at the expense of the people of Britain. But, also, experience has shown that we cannot hope to trade largely with the hard-currency area. Many of its countries often have burdensome surpluses of the very goods which we produce. Though we may sell small lots of butter, meat, cheese, and other products to these countries, we cannot build our economy on this scattered trade. Our whole economy has developed during our first 100 years on a foundation of sales to one main market, Great Britain. We are now under contract to supply her with 97 per cent. of our exports of butter and cheese and 100 per cent. of our meat exports. This is the world's greatest market for overseas trade in primary products and we most certainly could not for many years find a substitute, if at all. If this market should fail, the damage to our economy would be incomparably greater than any temporary advantage we might get by seeking to send more than small quantities to other markets. The truth is we cannot swap horses. Our destiny lies with Britain and we must see that she pulls through.

"It is a part of our duty and our privilege to be able to help Britain to close the gap by keeping down the prices at which we sell her the food she needs to keep her people going. That can be done by holding our costs.

"We provide Britain with more than 56 per cent. of her butter, about 50 per cent. of her cheese, and 25 per cent. of her meat in addition to a great part of her wool, hides, tallow, and other essentials. The volume of goods which Britain can import is limited by her overseas buying power, and therefore it is clear that every rise in price in New Zealand must affect the volume of imports of food and other essentials into the United Kingdom and thereby affect her standard of living now or in the future.

Britain Must be Able to Sell Cheaply

"Britain wants to continue to sell more abroad to keep her own industries going, but she must be able to meet increasing competition in the markets in which she sells. Other countries must export to live, and many countries which formerly provided easy markets for her goods now produce the same things themselves and need to import less. The answer is that Britain must be able to sell cheaply and she cannot do this unless her costs at home are cut. This is a problem she is tackling at present, and we as a supplier to the British market are directly concerned. There is a school of thought in this country that considers that we should demand for our exports to Britain the price she is forced to pay to other producers of similar goods. If we demand higher and higher prices for our food exports to Britain, she will find it harder and harder to compete in selling her goods in world markets.

"It is not out of place to point out here that costs of production in Denmark are extraordinarily high. Britain has been paying Denmark 321s. 6d. for every cwt. of butter she buys while New Zealand receives 235s. per cwt. When the Danish contract was made the Danish farmer could not produce the butter even at this much higher price, but had to be paid a further 20s. per cwt. by his own Government before he could meet his cost of production. We in New Zealand are, through natural advantages and the stabilisation of our costs, still able to produce at the 229s. 7d. per cwt. which is paid out to our farmers. This price more than adequately covers farm and factory costs. It gives our farmers a good standard of living, which is increasing on every efficient farm. The remaining 5s. 5d. per cwt. over the price paid out to the farmer will add approximately £1¼ million to the industry's substantial reserves.

"The meat industry, similarly, will have its costs more than met this season by export prices. This can be seen in the estimate that more than £2 million will be added to the Meat Industry Account this season. It should be noted that this overall surplus is accruing, even though more than the export price is paid out to encourage the production of certain types of meat, for example, pig meats.

"The wool grower's receipts are also high. The average price for 1947-48 was 25.61d. per lb., more than double the 9.17d. per lb. average in 1938-39 or the 12¼d. which was paid out during the first three seasons of the wartime purchase arrangements.

Protection of Overseas Funds

"There is, of course, a limit to the extent to which we can afford to keep our prices low. Not only must we cover the farmer's costs, but we must also cover our necessary imports and so protect our overseas funds. It is easy to forget one while thinking of the other. A country's standard of living must be lower if the prices of its exports have not risen as far as the prices of its imports; that is, if its terms of trade are unfavourable. At the national conference in August, 1947, it was agreed that, in following a policy of not embarrassing the United Kingdom Government by seeking world market prices for our products, the terms of trade position must be taken into account in order not to impair our own internal stability.

"Various ways by which we may help to develop sterling area supplies are under consideration, but our main contribution must be in the form of increased exports to the United Kingdom. The Aid for Britain National Council is satisfied that the sound policy is to increase our primary production to a maximum and at the same time keep down our costs.

"We must remember how much better our standard of living is than that of most of the other countries of the world, who are still suffering from an acute food shortage. Apart from the supply of bread grains and sugar there is very little sign of any alleviation of the world food situation. In our own interests we must therefore send as much food as possible overseas. Food parcels are a good gesture and one that the national council supports, but the real solution is to produce more food for export in bulk. As Sir Stafford Cripps told the Trade Union Congress recently, 'Our object can be achieved in two ways. Either we must use more muscle or more brain, and I am in favour of more brain. I would rather see the introduction of new methods and new machinery than longer hours of work.'

"But we must not wait for the new methods to be imposed upon us. We must develop a new interest in our work and we must see it as part of the world's effort to set its house in order. If every one of us does what he can without looking over his shoulder at the other man, we will find that the comforts we now enjoy, the standard of living which is at present ours, may continue. Britain's standards of living are largely sustained at present with American gifts and loans of dollars, and quite rightly so. The Americans see clearly what a debt the world owes to Britain and are prepared to pay their part of that debt to see Britain through her critical years of recovery. But if Britain is largely depending on these gifts and loans just now, so to a degree are we. The benefits are ours as well as hers. If by 1952 Britain is still short of her targets, and the dollar gifts and loans begin to shrink, as ultimately they must, we all must suffer. Sir Stafford Cripps has stated, 'There is only one way, and that is by each producing more. There is no other answer.'

Every Production Problem Must be Fought

"Though this is only a brief survey of the facts, it discloses how critical Britain's position, and ours, still remains. It is obvious from the survey that it is in the interests of our own economy and the rights and privileges we enjoy that we should fight every individual production problem as a vital phase in the long battle to see that Britain wins through.

"We in New Zealand have our difficulties, of course. Surely we can remind ourselves again, however, just how fortunate we are and of the comparative standard of comfort and peace of mind we enjoy. Perhaps we should remind ourselves of that fact more often and, more important, that it is to Britain, to the people of Britain, that we owe our position. They stood for us and still stand for us. Their efforts were and are an inspiration to the world.

"These are points to keep in proper perspective when we talk of our effort, of our rationing, or our difficulties. We must continue to act up to our motto established by our late Prime Minister, the Rt. Hon. M. J. Savage, 'Where Britain stands we stand.'"

Work of National Council in Increasing Production

"THE first meeting of the Help Britain Committee, whose title was later changed to Aid for Britain National Council, was held on August 28, 1947, almost immediately following its formation at the big Dominion conference in Parliament Buildings on August 20, 21, and 22, 1947," said Mr. Walsh.

"Thus we have now operated for a full 12 months and the time has come to review our position. How far have we been successful in carrying out the task entrusted to us by the conference? To what extent must our activities be continued? In what direction should our efforts be concentrated in the coming months?

"An answer to these questions can best be formed by restudying what Britain asked of us at that August conference.

"Mr. Attlee's cable of August 16, 1947, referred to our efforts up to that time to obtain further supplies for Britain of New Zealand's primary food products, our rationing of these products in New Zealand to enable more to go to Britain, and the welcome gift food parcels being sent. He said that in general it was along these lines that they asked for our continued and increasing aid.

"He referred in some detail to three matters upon which we could give help: (a) Food exports; (b) turn-round of shipping, and (c) imports.

"In reference to food exports he said that any steps we could take to increase and accelerate supplies of dairy products, meat, and animal fats were of the highest importance. What then has been done regarding exports in meeting these wishes?

Food Production

"With good weather in the early part of the season farmers' efforts seemed to be likely to result in a very considerable increase in production. Droughts and floods, however, and a hot, dry summer and autumn set production back. The final result, in spite of these handicaps, was a considerable increase in meat production, as the following figures, based on the normal meat year ending September 30, show. (This date also coincides closely with the beginning of the Aid for Britain Campaign.)

SLAUGHTERINGS AT MEAT EXPORT WORKS AND ABATTOIRS FOR SEVEN MONTHS OCTOBER TO APRIL, INCLUSIVE

	Thousand head of stock				
	Cattle	Calves	Sheep	Lambs	Pigs
1945-46	365.2	251.5	3,567	10,030	524.2
1946-47	336.1	252.4	3,186	9,826	502.8
1947-48	402.8	281.6	3,198	10,916	537.8

"The figures for 1947-48 show considerable increases over those for the previous year in each case and over those for the last two years in every case except sheep.

"Undoubtedly constant publicity hammering home the need for more production to help Britain contributed largely to these increases.

"The second major food item in our export to Britain is dairy produce. Very considerable increases in production were recorded, as shown in the following table, the figures for which are based on the normal dairy year ending June 30. (This date does not correspond exactly with the operations of the Aid for Britain Campaign, but does give a useful guide.)

DAIRY PRODUCTION FOR 10 MONTHS JULY TO APRIL, INCLUSIVE

	Butterfat lb. (million)	Creamery butter tons (thousands)	Cheese tons (thousands)	Canned milk products tons (thousands)
1945-46	305.4	118.3	88.1	21.71
1946-47	335.9	135.4	87.8	26.22
1947-48	349.8	143.8	83.9	27.76

"These figures also show a considerable increase over those for production in either of the last two years, with the exception of cheese production, where there has been some diversion of supplies to other food uses.

"We can answer the first question, therefore, by saying that we have met Mr. Attlee's request for an increase in the production of dairy produce and meat. Figures for the production of animal fats are not available, but exports of refined animal fats for 1946 were 1001 tons and for 1947, 1855, a valuable increase. Tallow exports were 24,700 tons for 1946 and 25,700 for 1947, again a useful increase.

"If the season this year is not unfavourable, we look forward to bigger increases in all our food production figures, as we know the farmers and all other producers and workers are strongly behind this campaign.

Organisation of Campaign

"How far has the Aid for Britain organisation contributed to this increase in food production?

"The national council now has district committees operating in 21 postal districts throughout the country. These committees were mainly set up at public meetings called by the mayors of the chief towns and consist of primary producers, employers, workers, social workers, and others with a direct interest in getting food to Britain. Sub-committees deal with farming problems, gift food, etc., and a close correlation with the district executives of Federated Farmers of New Zealand is achieved in all farming districts.

"In this way food production problems may frequently come to the local primary production sub-committee from its farming representatives. If they cannot immediately overcome the problem, it is passed on to the main district committee. If local action is not sufficient and the problem is one of national importance, the district committee, through its paid secretary-organiser where there is one employed, investigates the local implications of the problem and reports to the national council for their action. The national council may be able to arrange with a Government Department to have the difficulty met, or may have to go to the Government. In either case experience has been that the utmost co-operation has been available. Government Departments and the Government have been fully alive to the need for tackling every separate problem retarding production, and I want to place on record here my very real appreciation of the spirit in which our requests have been met by officials in every Department and by the Government, from whom, from the Prime Minister downward, we have always had the warmest support and the speediest help.

"Another channel for acquainting the national council with our primary production requirements has been established and has proved invaluable in getting speedy attention to local or national problems. Federated Farmers have a strong organisation throughout the country, and problems are frequently brought direct to our attention by their local executives or through their Dominion council. Indeed, local officials of Federated Farmers regularly straighten out difficulties before production can be badly held up, and in this way and by assisting in organising public meetings and conferences and by arranging newspaper and radio publicity for the national council these local executives have become practically agents of the Aid for Britain Campaign. Their co-operation and the co-operation of their Dominion president, Mr. W. N. Perry, their national secretary, Mr. A. P. O'Shea, and his council have been invaluable and sincerely appreciated.

Direct Contributions of Council

"The national council can claim to have contributed directly to improving production during the last 12 months in a number of very important ways.

Fertilisers

"Without the direct intervention of the national council considerably less fertiliser would have been available on farms this year. In one instance a large works was preparing to close down for a protracted overhaul, during which no fertiliser would have been available. At the urgent request of the council workers did long overtime and weekend hours to create a backlog of fertiliser which was called on to meet orders during the overhaul period.

"In three other works in the north available treated supplies accumulated because of a shortage of transport. On the instigation of the national council a conference of railways, transport, agriculture, labour, and union representatives arranged a scheme for special weekend trains to carry fertiliser out to country stations. Within five weeks 3000 tons of additional fertiliser were on the farms at a critical period of the autumn.

"The national council was recently advised of an accumulation of fertiliser at some works, workmen in some cases being put off owing to a lack of orders. The falling off was more than the usual seasonal slackening and it was found that farmers were holding off their orders in anticipation of a price change. As any continuation of this policy would have resulted in a material intensification of the rush period, when farmers have usually found it extremely hard to get their orders met in reasonable time, action was taken to ask the Government for an immediate announcement. Within a few days a new season's price was announced embodying a retrospective reduction, and orders were immediately stimulated, firms once more taking on fresh hands to meet the demand.

"The result of these actions alone must have been a very considerable increase in the food available next season, with a consequent increase in the amount we ship to Britain.

SPEEDWAY

LOW & HIGH PRESSURE
OIL BURNING
BOILERS

Write for free illustrated catalogue to
SPEEDWAY PRODUCTS LTD.
26 Albert St., Auckland
South Island Distributor:
A. H. TURNBULL & CO. LTD.
Christchurch

Se.1.2

FOR
TOP PRODUCTION
FEED
TOMOANA DAIRY RATION
GO HAND IN HAND—

CONSULT YOUR PRODUCE MERCHANT

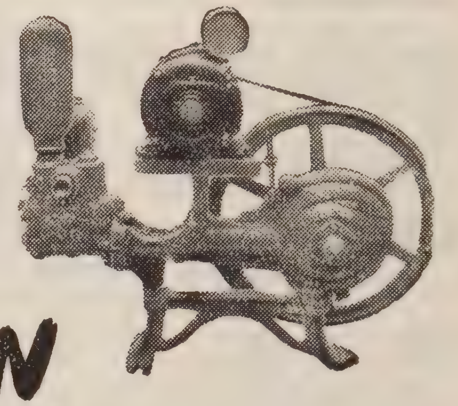
J.8

ELASTRATOR
PROVED QUICKER
SAFER THAN THE KNIFE

Experience has shown that ELASTRATOR is safer. It's bloodless, prevents dangerous infection, and fly strike is usually completely eliminated. Lambs don't suffer from shock and "mother-up" at once. Top-price carcasses result. Get full particulars about ELASTRATOR from your Stock Agent, or direct from ELASTRATOR Co. Ltd., Box 226, Blenheim.

This is the Modern Method. The rubber ring is affixed to the purse, above the testicles. Circulation is stopped. The testicles and purse atrophy and fall off, completing castration.

ELASTRATOR CASTRATION
BLOODLESS AND SAFE!



PROVED!

ON FARMS ALL OVER N.Z.

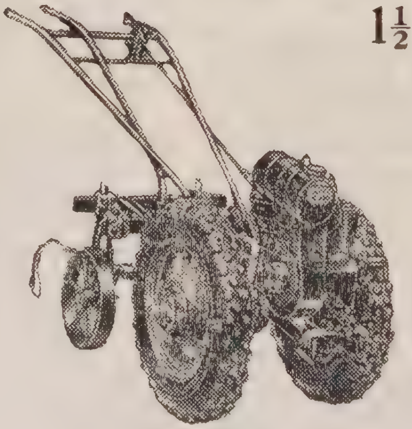
The popular Renown Double-Acting Belt Driven Service Pump gives the same service as a city high pressure supply; two models, pumping 280 and 350 gallons respectively.

Write or call for Free literature and information covering the Renown line.

W. H. PRICE & SON LTD. 34-36 Manchester St.
Christchurch.
P.O. Box 1084.

RENOWN

PUMPS & AUTOMATIC PRESSURE SYSTEMS



THIS is the machine YOU NEED!

The World Famous
WARD'S "**Simplicity**"
REG. U.S. PAT. OFF.

1½ H.P. HOE-TRAC

MOWS . . PLOUGHS . . CULTIVATES . . HARROWS . . HOES SEEDS

Exclusive N.Z. Distributors:
AGRICULTURAL CULTIVATORS (N.Z.) LTD.,
P.O. Box 1102, Auckland.

POST COUPON NOW

To AGRICULTURAL CULTIVATORS (N.Z.) LTD., P.O. Box 1102, AUCKLAND.

Please forward to me full particulars of the world famous Ward's "Simplicity" 1½h.p. Hoe-Trac.

Name ....
Address ....
.... J.A.

Farm Machinery

"Our campaign had not been opened long when investigations revealed that farmers were in urgent need of greater numbers of tractors, particularly crawlers, and more farm machinery if useful increases in production were to be obtained.

"Conferences were held with farmers' representatives and departmental heads, and for the first time in this country a complete survey was made of the tractors and machinery already available and of the country's minimum future requirements.

"Following the national council's recommendation which, we regret to say, met with stubborn and persistent opposition from certain quarters, the Government, wisely, in our opinion, agreed to release an additional $1 million for the purchase of further tractors and spare parts from dollar areas and thus assist in the campaign for increased production, with particular emphasis on wheat growing.

"This decision has been more than justified by results, and a striking increase of cereal acreage and other food production is already assured.

"A committee specially appointed by the Government for the purpose, on which the Aid for Britain National Council has been represented by the chairman, has been further investigating the whole question of importation of tractors and machinery for 1949 both from dollar and sterling areas.

"A number of meetings have already been held with farmers' representatives and representatives of companies importing both British and American tractors, and it is expected that arising from these meetings a complete understanding on the country's requirements for tractors and other farm machinery will be reached and the Government advised accordingly.

Wheat Growing

"Last year the lowest acreage of wheat New Zealand had planted for many years, 122,000 acres, was harvested. In view of the vital need for an increase in the world's grain supplies and to reduce New Zealand's calls on wheat supplies elsewhere, members of the national council carried out an intensive campaign of farmers' meetings and of publicity throughout the wheat-growing areas. The campaign was well received and farmers were most co-operative. Autumn sowings have shown a marked increase over last year's, and the Dominion president of Federated Farmers, Mr. W. N. Perry, has estimated that completed sowings should approach 200,000 acres this year if spring weather is reasonable. This is still far below minimum requirements, but a pleasing result of the first year's campaign. Next year we confidently hope for a further great improvement in wheat acreage. Special meetings were held under the auspices of the national council in Christchurch last year, when difficulty was being met in getting the harvested wheat into store and urgent arrangements were made for extra road transport licences to be issued. The licensing authority, by special instructions from the Government, was authorised to grant licences wherever necessary to help shift the wheat, and by this and other special measures the harvest was got in with the minimum loss. In the coming year similar arrangements will be made and the Government has authorised a special committee to meet shortly to deal in advance with any problems that can be anticipated.

Other Farm Supplies

"Constant attention has been given throughout the year to the procurement of such other farm requirements as fencing wire, cement, steel for dairy factory extensions, etc. Regular pressure has been kept on buying authorities and distributors, with useful results. The wire position has been critical, but supplies of both baling wire for hay, etc., and fencing wire will be much easier this year as a result of purchases in many different markets. The Building Controller, in line with a policy of allocating extra cement to farmers in the slack winter months, has met our requests for special allocations to several districts and the same co-operation has been received in obtaining steel and cement for renovations or expansions to dairy factories and other buildings.

Hay Subsidy for Drought and Flood Relief

"A proposal brought to us by Federated Farmers for getting relief to farmers hard hit in the drought and flood areas received the fullest co-operation from the Government, with the result that well over 1000 tons of hay bought at a fixed ceiling price and financed if necessary by Government-guaranteed loans were railed at subsidised rates to the flood and drought districts. This has certainly ensured a saving of stock which would otherwise have been killed and thus largely prevented a fall in food production in those areas in the coming season.

Labour for Urgent Farm Work

"Critical positions commonly develop, particularly in the harvesting season, when labour is urgently needed to save crops but is in very short supply. The national council has established a link with many districts which enables us to put out special radio and newspaper appeals which have resulted many times in the needed labour being made available. Fertiliser and freezing works and farmers harvesting fruit, tobacco, etc., have used this service and it is clear that production has been saved as a result.

Turn-round of Shipping

"The problem of the turn-round of shipping has been one of continuous concern to the council and it cannot be said to be satisfied with the situation. Undoubtedly, however, this is a subject in which generalisations are inadequate and often inaccurate. The council has examined the particular problems which affect the turn-round, including such factors as transport delays, wharf congestion, and uneconomic handling practices. Reports on these have been submitted to the Government.

"Cargo control committees, which were re-convened following the original August conference, have had some success in clearing bottlenecks.

"The whole of this complex field relating to the shipment of our food to Britain has received and is continuing to receive the close attention of the national council.

Conservation of Sterling and Dollars

"Mr. Attlee's request for us to refrain from drawing on our sterling balances has meant a continuation of import restrictions. The support of the community generally has been retained, and manufacturers and importers, though occasionally criticising the Government's policy, have usually recognised the need for controls. This is a question of Government policy and the council is concerned only to a limited extent if restrictions should seem to be retarding the production of food.

"Though the restoration of parity in our exchange rate will mean that we can buy more British goods for our money than previously, it will also mean that our export income in the future will be lower. Thus Mr. Attlee's request that we keep our purchases from Britain within the limits of our sterling income still applies with its force unchanged, and we should not expect any loosening up in this respect.

"Restrictions on the amount of dollars made available for imports have been well received, as the effects of the dollar shortage on Britain are well known, and it is widely understood that any dollars we take leave so much less in the pool for the people in Britain. Where food production in New Zealand can be directly increased by purchases of equipment in the United States dollars are generally made available and the Aid for Britain Campaign has not had to make representations to the Government for more dollars, except in the case of the purchase of tractors of a type unprocurable in Britain.

"The dollar difficulty shows no sign of easing and in the coming months we shall have to continue to produce the maximum of food without heavy calls on dollar exchange.

Gift Food

"Mr. Attlee's appreciation of the gift food parcels being sent has spurred voluntary workers throughout the country and there has already been a very great increase in the quantity of gift food being sent. The fact that posted parcels have not greatly increased in number is due to the extension of bulk sending, which enables more food to be sent for the same money.

AID FOR BRITAIN CAMPAIGN . . .

"During the year the central Food for Britain Committee, operating under Mr. T. N. Smallwood in Wellington, handed over its functions to the Aid for Britain National Council. This has meant no change in the districts, where voluntary workers have continued their splendid work either under the old organisation of the local Food for Britain Committees or after amalgamation with larger district Aid for Britain Committees.

"The national council is continuing to operate and extend the British Ministry of Food's bulk gift scheme, which permits gift food to be sent in cases, each tin bearing a sticker with the donor's name and address so that the personal touch is retained. These cases are sent freight free and delivered by the Ministry of Food to organisations such as hospitals, homes for the aged, local authorities, etc., for free distribution to individual needy people. This scheme is being widely extended in New Zealand and provides a valuable outlet for voluntary effort. A parallel scheme has been instituted for schools, who are thus able to send gift food to their counterparts in Britain. Hundreds of cases of gift food are leaving our ports each month under these two schemes, and the value not only in food to Britain, but in the development of stronger Commonwealth ties, is almost incalculable.

"The national council during the year adopted the Barling fat collection plan, which had proved so successful in Otago and Southland. With the council's help this plan has been put into operation in many other districts, and hundreds of pounds of first-class edible fat are going to Britain each month as a result. Otago and Southland are still extending the scheme under Mr. Barling's indefatigable administration, and in other centres depots are functioning to an increasing extent.

"Coupon saving continued to achieve valuable results. The actual value of meat or butter saved has been outweighed by the effect upon the public conscience of this constant reminder of our duty to Britain, and the competitive spirit encouraged in coupon saving between districts and between localities is a sure way of keeping the aims of the campaign permanently before the people.

Future of Campaign

"Unfortunately there is no indication at present of any material improvement in Britain's position and our continued efforts to increase the amount of food we can send to Britain will be just as essential in the coming year as they have been in the last 12 months.

"No one reading recent figures on Britain's present situation or Sir Stafford Cripps's frequent looks into the future can resist the compelling impression that Britain's position is still critical and her need as great as ever.

"I think I am not misreading the Government's mind when I say that the Aid for Britain National Council will continue in existence as long as Britain's crisis continues, and in the coming 12 months will use its utmost efforts to maintain in New Zealand a sense of Britain's need and a determination to do all that our country can to see Britain through."

Mr. Walsh's statement concluded with an expression of appreciation for the work done by members of the Aid for Britain National Council and district committees and the support given by the Press.

GRADING POINTS FOR EXPORT BUTTER AND CHEESE

Leading Factory Averages for Year Ended July 31, 1948

Contributed by the DAIRY DIVISION.

BUTTER-MANUFACTURING companies which obtained an average grade of 93.75 points or more and cheese-manufacturing companies which obtained an average grade of 92.75 points or more during the year ended July 31, 1948, are listed below in order of merit. Of the total listed 23 butter and 14 cheese factories are in the North Island and 6 butter and 6 cheese factories in the South Island.

Cheese

Company	Registered Number	Brand	Tonnage Graded	Average Grade Points	Grading Port
Tisbury	701	Tisbury	188	93.154	Bluff
Riverdale	106	Trident	1001	93.142	Patea
Kaupokonui (Kapuni branch)	1629	Kaupokonui	336	93.078	Patea
Greytown-Wairarapa	529	Greytown	621	93.032	Wellington
Tuturau	132	Tuturau	68	93.001	Bluff
Pembroke	234	Pembroke	489	92.957	New Plymouth
Wright's Bush	206	Wright's Bush	307	92.921	Bluff
Oteramika	813	Oteramika	247	92.907	Bluff
Maketawa	342	Maketawa	471	92.898	New Plymouth
Oxford	15	Oxford	367	92.896	New Plymouth
North Taranaki	723	Flax	110	92.863	New Plymouth
Dalefield	9	Dalefield	882	92.858	Wellington
Hawera (Tokaoro branch)	1739	Federation	506	92.851	Patea
Ngaere	25	Triumph	714	92.831	New Plymouth
Kaimata	992	The Oaks	494	92.807	New Plymouth
T.L. Joll (Otakeho branch)	1724	Maori Chief	627	92.781	Patea
Okato-Puniho (Leith Road branch)	57	Okato	358	92.761	New Plymouth
Morton Mains	1604	Morton Mains	200	92.760	Bluff
Opouriao	1169	Opouriao	403	92.757	Auckland
Awarua	545	Awarua	362	92.752	Bluff

Creamery Butter

Company	Registered Number	Brand	Tonnage Graded	Average Grade Points	Grading Port
United	1296	Whariti	193	94.295	Wellington
Kaikoura	302	Kai	192	94.262	Lyttelton
Te Aroha-Thames Valley	344	Overseas	2244	94.211	Auckland
Konini	1203	Konini	592	94.184	Wellington
Westland	145	Westland	231	94.152	Lyttelton
Wairoa	1345	Wairoa	134	91.149	Hastings
Rangitikei	1360	Rangitikei	523	94.131	Castlecliff
Golden Bay	146	Sovereign	620	94.073	Wellington
Karamea	1570	Karamea	133	94.069	Lyttelton
Inter-Wanganui	6	Inter-Wanganui	133	94.050	Lyttelton
Awahuri	664	Red Rose	636	93.998	Wellington
Cheltenham	3	Pakeha	1051	93.998	Wellington
Rangiwahia	750	Quail	7	93.996	Wellington
Rodney	394	Rodney	622	93.992	Auckland
Taihape	1188	Tikapu	149	93.988	Castlecliff
Wangaehu	1326	Wangaehu	388	93.970	Castlecliff
Okitu	1270	Okitu	92	93.956	Gisborne
Kia Ora	926	Kia Ora	576	93.899	Gisborne
Kuku-Manakau	905	Ohau	300	93.864	Wellington
Waitoitoi	20	Waitoitoi	342	93.864	New Plymouth
Mangorei	345	Mangorei	956	93.849	New Plymouth
N.Z. Dairy (Ngatea)	291	Anchor	1653	93.832	Auckland
Rangitaiki Plains	133	Rangitaiki Plains	5154	93.822	Auckland
Levin	910	Lake	878	93.819	Wellington
Arahura	1516	Arahura	11	93.796	Lyttelton
N.Z. Dairy (Waiuku)	111	Anchor	2524	93.782	Auckland
Uruti Valley	300	Uruti	222	93.766	New Plymouth
N.Z. Dairy (Morrinsville)	415	Anchor	2514	93.756	Auckland
N.Z. Dairy (Ngongotaha)	724	Anchor	1198	93.756	Auckland

TALL FESCUE GRASS IS POISON FOR CATTLE

By I. J. CUNNINGHAM, Superintendent,
Department of Agriculture Animal Research Station,
Wallaceville.

CATTLE become lame and their feet may drop off if they are grazed too long on tall fescue grass, which is harmful at all seasons of the year and should be regarded as a dangerous poison plant for cattle.

MOST farmers who have tried to run cattle on tall fescue grass will have observed the serious effects that occur. Within about a fortnight of beginning to eat the fescue some cattle become lame. The lameness starts in one of the hind feet, usually the left, and may later spread to the other. The lame foot, or "fescued foot" as it is popularly called, is swollen about the fetlock, extremely painful, and is used only with the greatest reluctance.

Most cattle will recover if they are shifted on to other feed at the first sign of lameness, which may disappear within a few days or weeks according to the degree of damage, but unthriftiness and loss of condition, due to interference with feeding, may persist longer.

Lame cattle left on the fescue do not recover; the foot soon becomes cold, the skin dries up and cracks, and part of the foot, the whole foot, or part of the leg may dry up and fall off. From this stage there is no recovery possible and the animal must be destroyed.

It has long been believed that the lameness or loss of feet is due to cattle eating the ergots which frequently grow on the developing seed of the tall fescue, because cattle fed ergot from tall fescue or from other sources such as heavily-ergotised ryegrass hay develop precisely the same symptoms as those shown by cattle which graze on tall fescue.

It is now becoming evident, for several reasons, that consumption of ergots cannot be the cause of the disease as it occurs in the field.

The first reason concerns the availability of the ergots, which are the resting stage of a fungus which attacks the flowering plant and which mature and fall at approximately the same time as the seed. Mature ergots therefore are available on the plant at about the same time as the mature seed, or approximately from January to March. If eating the ergots was the cause of the trouble, the disease could be expected to occur during late summer, but it actually occurs most frequently in winter, because it is then that dry cattle are turned off on to the type of rough areas that carry fescue; it does, however, also occur in spring, when there is no seed head on the plant, and indeed it occurs at practically any season of the year if cattle are forced to eat a diet consisting mainly of fescue. The occurrence of the disease is not therefore associated with eating the ergots on the mature seed head. It is doubtful if mature seed heads are ever eaten, as they are most unpalatable; if cattle must eat fescue, they prefer the green leaf.

It might be thought that dropped ergots would be picked up from the ground when cattle graze round clumps of tall fescue. It is not easy to find even one ergot on the ground, and it would therefore be virtually impossible for a beast to pick up 2 to 4oz. each day, which is the amount experiment has shown must be given to a cow for about 10 successive days to produce ergot lameness.

Finally and more conclusively it has recently been found at the Department of Agriculture's Animal Research Station at Wallaceville that tall fescue cut and made into hay at the end of April caused typical lameness in a cow to which it was fed. There were neither seed heads nor ergots fed in the hay, yet the fescue hay produced lameness and "fescue foot" similar in every way to cases seen on farms.

The only possible conclusion is that the tall fescue leaves contain some poisonous principle which will cause lameness or shedding of feet similar in all respects to the results from feeding ergot. The substance has still to be identified and work is proceeding with that object.

The present evidence is sufficient to warrant the view that tall fescue grass is a dangerous poison plant for cattle. It is true that no ill effect has resulted from stocking some areas of fescue with cattle, but this might have been because the poison was absent from the fescue on that area or because there were other harmless grasses, weeds, etc., on the area which the cattle ate instead of the fescue or with the fescue, so diluting its poisonous effect. It is true also that not all cattle are equally susceptible and some among a mob show no effect in the same time that others develop severe lameness. In the experiment at Wallaceville a difference in susceptibility was observed. Of three cows fed the fescue hay one became grossly lame within a fortnight and later had to be destroyed, a second was slightly lame for a short period only, and a third was unaffected by a month's feeding.

Other stock do not seem to be susceptible. Horses can remain healthy for long periods on fescue that has caused lameness in cattle, and they are apparently not at all susceptible to the poison. Sheep are not often run on fescue and information on their reaction is not available.

Obviously tall fescue should be eradicated or cattle should not be grazed upon it. Admittedly both of these courses present difficulty on some farms. It rests with the individual farmer to weigh up the difficulty against the possibility of lameness or loss of some of the cattle.

If fescue-infested areas must be grazed, there are some possibilities of avoidance of trouble that can be explored. The grazing is safer when there is a lot of other herbage growing with the fescue which cattle can eat instead of the fescue or which can at least dilute the amount of poison plant eaten. Careful watch should be kept and cattle should be removed as soon as they have cleaned up other growth and are being forced on to a diet mainly of fescue. As symptoms seldom develop until cattle have been kept on fescue for about 10 days to a fortnight, spells of a week's grazing would be safer than continuous grazing, but even with this procedure careful watch is necessary and all cattle should be shifted at the first sign of lameness in any one. Certainly hay should never be made from tall fescue.

The above suggestions are made only for those cases where there is no alternative to grazing on areas infested with tall fescue. The best course is eradication of the plant, which is a matter which should be discussed with the Instructor in Agriculture for the district. It involves deep ploughing in of established plants and digging out of any that are missed, cultivation or cropping to destroy the young seedlings that will later come up from the many live seeds that are distributed by fescue, and the establishment of good pasture swards by proper sowing of seed and fertiliser and by correct management. This may be an expensive project, but it will increase returns by giving a pasture that is of use for production and by reducing disease.

CHRISTMAS ISLAND PHOSPHATE

New Zealand and Australia Acquire Rights to Deposits

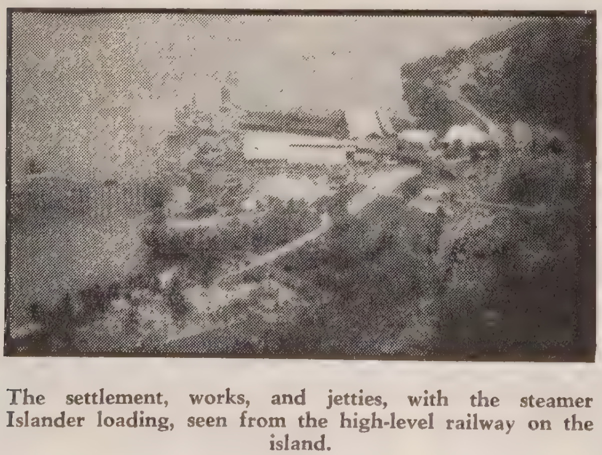
PHOSPHATIC rock supplies for fertiliser manufacture available to New Zealand and Australia will be increased by more than a third with the acquisition by the two Governments of the rights to the large deposits on Christmas Island, a British possession 200 miles south of Java and 1400 miles from Fremantle, Western Australia. These deposits rank second only to those of Nauru and Ocean Islands in importance to New Zealand and Australia. They are estimated to contain 30,000,000 tons of rock of a grade second only to that of Ocean Island.

SINCE 1897 the island's deposits have been worked by the Christmas Island Phosphate Company, Ltd., under a 99-year concession granted by the Crown to two men in 1891, and in that time production has been more than 4,700,000 tons. Immediately before the war the island's annual output was about 200,000 tons, almost the whole of which was sold to Japan, with one cargo yearly to South Africa and an occasional cargo to Europe. Engineers who visited the island in 1932 and 1946 reported that the rate of production could be more than doubled without great difficulty. The island was occupied by the Japanese for about three years during the war. Some of the plant was disabled before the occupation and the Japanese removed some of the equipment, but the damage and loss were very much less than at Ocean and Nauru Islands.

At present New Zealand and Australia in partnership with the United Kingdom exercise control over phosphate deposits on only Ocean and Nauru Islands. With the expected increase in demand, it is feared that their availability will be of comparatively-short duration. Before the war the requirements of the two countries were 1,000,000 tons a year, and that figure has been exceeded since. If the Christmas Island deposits were to continue to be worked at the past relatively-low rate, eventually all the high-grade reserve would be at Christmas Island, which would not be in the best interests of New Zealand and Australia.

History of Negotiations

Between 1926 and 1929 the New Zealand and Australian Governments authorised negotiations with the Christmas Island Phosphate Company for the purchase of its rights for the remainder of the period of its concession, but the figure quoted by the company was considered too high.



The settlement, works, and jetties, with the steamer Islander loading, seen from the high-level railway on the island.

A view across the anchorage at Flying Fish Cove. The steamer Islander, which is included in the assets bought, is lying at anchor.

In 1939 a further unsuccessful approach was made. However, recent negotiations by the general manager for the British Phosphate Commissioners have resulted in agreement for the purchase by the two Governments of the company's interests and assets at Christmas Island. The assets include a 1900-ton steamer which is very suitable for the trade. The agreement will be effective from December 31, and the purchase price is £2,750,000 sterling. The two Governments will share the purchase price, other expenses, and the provision of working capital.

The property will be vested in an authority to be appointed by the New Zealand and Australian Governments, and the phosphate will be distributed by the British Phosphate Commissioners in conjunction with the supplies obtained from Ocean and Nauru Islands to meet the requirements of the two countries. That from Christmas Island, which at present is being bought by the commissioners under an ordinary commercial supply contract, will continue to be delivered to the nearest fertiliser works in Australia, principally in Western Australia, which will mean the release to New Zealand of a corresponding tonnage of phosphate from Ocean and Nauru Islands.

The present price of Christmas Island phosphate is 50s. a ton—considerably more than that of Ocean and Nauru Island supplies—but it is expected to be reduced considerably. Geographically Christmas Island is better situated than either of the other two islands to supply Western Australia, being 3000 miles closer to Fremantle, which means that transport charges will be correspondingly lower.

Description of Island

Christmas Island, with an area of 60 square miles, is the flat summit of a submarine mountain of which about 14,000ft. are submerged and 1000ft. above sea level. The surface of the plateau is studded with flat-topped hills and low ridges and reefs of limestone. On the rounded hills occur the phosphatic deposits which give the island its commercial value. They are probably the result of long-continued action by a thick bed of seabird manure, which has converted the carbonate of the underlying limestone into phosphate.

The circumstances of its discovery are unknown, but it appears on a Dutch chart of 1666 under the name of Moni. Dampier visited it in 1688 and found it uninhabited. A ship of the Royal Navy discovered an anchorage there in 1886, and in 1888 the island was annexed by Great Britain and placed under the administration of the governor of the Straits Settlements; in 1900 it was incorporated with the settlement of Singapore.

The climate of the island is healthy, with temperatures varying between 75 and 84 degrees F. and an ample but not excessive rainfall. The prevailing wind is the south-east trade, which blows during the greater part of the year.

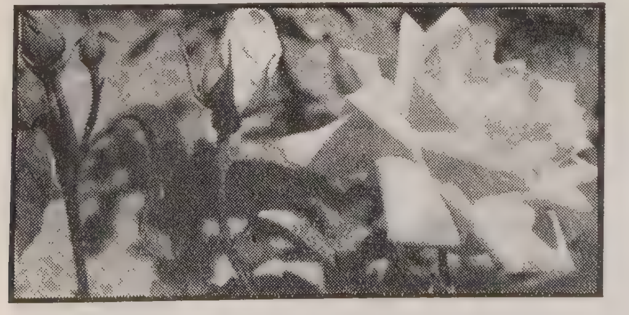
Christmas Island is also the name of an atoll within the Gilbert and Ellice Islands.

Preparing for the Christmas Spell in the Flower Garden

[*Photo News Ltd. photo.*

MOST of December's big tasks in the flower garden should be completed by the middle of the month, leaving the garden "ship-shape" so that the gardener can slacken off during the Christmas holidays with an easy conscience and enjoy the fruits of his earlier labours loafing in the garden or go away without the feeling of having left too much undone. These timely reminders are by J. P. Hudson, formerly of the Horticulture Division, Department of Agriculture, Wellington.

ANNUALS from the later sowings should be finally thinned and any weeds pulled out by hand, as little use can be made of the hoe between plants in a mixed flower border. If necessary, stick short brushy branches between the plants to give them general support, but it should not be necessary to stake and tie any but the tallest and most vigorous annuals. Take the opportunity of the general "go-through" to remove fading flowers and developing seed pods from annuals, even though that involves cutting off spikes that still have a few unopened flower buds at their tips. Annuals can give a long display of flowers only if regularly relieved of dead heads.



The rose is the undisputed queen of the summer garden. For the finest flowers roses should be disbudded, the side buds being removed and the centre one on each stalk being left to develop.

Begonias growing in pots should now be showing flower buds and should be given dilute liquid manure every fortnight to keep them growing strongly. Unwanted side branches ("laterals") should be removed, and can still be used as cuttings to provide late plants. The small side flowers should be removed, as they have little decorative value, leaving only the main terminal flowers to grow.

Borders should now be given a thorough overhaul, dying bulb foliage being taken out, marguerites, wallflowers, hybrid wallflowers, and other spring-flowering plants that have passed their peak being cut back hard or pulled out to make way for other plants, and all gaps planted up with late-raised bedding plants, especially calendulas. The early-summer overhaul does not take long if the borders have been well looked after but makes a great difference to the general appearance of the garden.

Bulbs of most spring-flowering varieties will now have finished their growth and the leaves will be changing colour except in the case of a few of the latest varieties of narcissi. Dying leaves can be removed, as described last month, or the bulbs can be lifted, dried off, and sorted over, without exposing them to too high temperatures or to direct sunlight. When the bulbs are thoroughly dry, clean off lumps of soil, pull away dried foliage, withered flower stalks, and loose broken skins, and gently separate bulbs which will come apart easily. Narcissus bulbs should not be separated unless they part easily and are fastened together only by dry dead tissue. Finally, sort the bulbs into grades, keeping separate those which are of flowering size and those not likely to flower next season, and store them all in a cool airy place until required for planting. Freesias, ixias, babianas, and other miscellaneous spring-flowering bulbs can also be lifted, dried, sorted, and stored, but they are often left more or less permanently in the borders. Where bulbs are growing in grass, the grass can be cut with a reaphook or scythe when the bulb leaves finally wither. Thereafter the grass can be mown normally. There is often a temptation to cut down overgrown clumps of grass and leaves too soon, because they look untidy, but it is a mistake to do so, leading to gradual weakening of the bulbs.

A visiting Dutch bulb producer recently surprised a group of New Zealand horticulturists by saying that retaining healthy leaves for as little as an extra three days could make all the difference between a first-class sample of bulbs and an inferior one.

HEADING PHOTOGRAPH

A small garden pool containing interesting and ornamental aquatic plants makes a fine garden feature.

" . . . and God, who made him, sees
That half a proper gardener's work is done upon his knees."

(Kipling)

Left—A regular "go-through" is necessary to remove weeds and dead flower heads, and to cut back plants whose display is over, if the border is to be kept bright and colourful.

Right—Lawn edges should be trimmed each time the lawn is mown to provide a really tidy finish. Ragged, overgrown edges spoil the effect even if the lawn has been well mown. If the lawn edge has been cut straight with a line at an angle of 45 degrees, edge trimming takes only a few moments.

Left—Carnation heads are heavy when fully open, and few varieties have stems strong enough to hold up the flowers unsupported. Thin, inconspicuous stakes should be provided, to which the stems can be tied with fine string or raffia or clipped with wire rings.

[*Sparrow Industrial Pictures Ltd. photos.*

WORK IN THE FLOWER GARDEN

Carnations which have finished flowering should be cut back hard, all long straggling shoots and those which have flowered being removed. Hard cutting back in early summer often results in a useful crop of flowers in autumn in varieties of border carnations, but the perpetual-flowered varieties have the longest flowering period. In relatively frost-free places they bear occasional flowers at all seasons, although the main crop is produced in summer.

Christmas presents for keen gardeners should not present a problem. Apart from plants, of which a great range is now available, books are always welcome presents. Dr. Johnson said that there are "two sorts of information—one that a man carries in his head and the other that he knows where to get." With the ever-increasing mass of horticultural knowledge, a good gardening reference book becomes more and more a necessity to the home gardener. Another suggestion is a hand lens, which makes a good present for a keen gardener and opens the door to a new world of beauty, quite apart from enabling diseases and pests to be recognised with greater certainty. A four-year subscription to the "Journal of Agriculture" would be appreciated by anyone who does not already take it.

[Douglas Elliott photo.

Cantua buxifolia (dependens) **is a very useful evergreen flowering shrub for milder districts where heavy frosts are not experienced. The plant, which grows to about 6ft. high, is covered each spring with unusual rose-coloured flowers.**

Chrysanthemums should be staked early, a short stake being driven behind each plant and the main stem tied to it. The stake when driven should not be quite as high as the flower stems are likely to grow. At this time of the year chrysanthemum plants usually look quite capable of growing unsupported, but it is fatal to delay staking until late summer, as an unexpected gale may blow a few over, cause the rest to rock, and give them all an unnecessary setback. Repot pot chrysanthemums into their final 8 or 9in. pots, using John Innes potting compost rammed very firmly with a potting stick. Stake each plant with one or more canes and pinch out the tips of most varieties to make them branch. Relatively-short pot plants are preferable for bringing into the house. They can be grown by potting up now a few rooted side shoots or very late-rooted cuttings, three plants in a 6in. pot, and growing them to flower without further potting. That rather discouraging treatment results in dwarf plants which flower at about 2ft. high and are very suitable for taking indoors in autumn. Varieties with light cream, pink, or yellow flowers are best for rooms decorated in dark colours, and gold or dark red varieties show up to best advantage against light-coloured walls.

[Douglas Elliott photo.

Bomarea multiflora **is a useful climber for relatively-mild districts, producing heads of orange-yellow spotted flowers at intervals through the greater part of the year. The seed pods, filled with bright orange seeds, are also interesting and decorative.**

Compost can be made quickly at this time of year if the heaps are not allowed to dry out. Water heaps that are dry and cover them over with old sacking to conserve the moisture. Properly-made compost heaps (described in the "Journal" for March, 1948) are not offensive in any way, but produce a most valuable type of bulk organic fertiliser from material which otherwise might be wasted.

Dahlias may need watering if the ground is becoming dry. If so, they should be given a thorough soaking and the surface of the soil broken up with a hoe an hour or two later to

WORK IN THE FLOWER GARDEN

Rhododendrons and azaleas suffer badly in summer if the sunshine beats down on the soil beneath them. The ground for some feet all around them should be mulched now with a generous layer of such material as compost, leaves, or old sawdust, especially when the bushes are growing as isolated specimens in a lawn. When growing in a shrubbery, neighbouring bushes give each other's roots some shade and protection.

prevent it from caking. Plants growing strongly may require a further tie looped round the whole plant and knotted to the stake to prevent it from slipping down. A few late plants can still be set out but are not likely to make much display before growth stops in autumn.

Fuchsias also may require watering if the season has been dry. The bushes should be growing strongly now and will appreciate a good soaking with water coupled with a light topdressing of superphosphate and sulphate of ammonia at the rate of ⅓oz. a square yard, well watered in, or an application of liquid animal manure diluted with water to the colour of weak tea.

Gladioli should be fed when the flower bud can be felt inside the sheath of leaves. Either liquid animal manure or the mixture of fertilisers recommended for fuchsias may be used, in each case thoroughly watered in. The plants can be fed every two weeks if very large flowers are wanted, but one or two feeds should be enough to ensure a really good garden display of flowers. Faded flowers should be snapped off early gladioli for the sake of tidiness and each spike cut off just above the level of the top leaves when all the flowers are over, but the leaves should be left to finish feeding the developing corms.

Hedges recently trimmed often produce a few fast-growing shoots within a short time after trimming. These are growths that were coming up inside the hedge, often growing strongly, but which had not quite grown to the outside of the hedge when it was clipped. Therefore the shoots continue to grow and make the hedge look ragged, though new side shoots still have not grown from the growths that were cut. Go over hedges a week or two after trimming to clip back the shoots not cut the first time.

Herbaceous plants now need attention. The earlier varieties like lupins, delphiniums, anchusas, and doronicums should be gone over, spikes of faded flowers cut off, and the plants generally tidied up. On lupins and delphiniums lateral flower spikes often develop after the main spike has been removed and give quite a useful second crop of blooms. When these are over, the stems should be cut to the ground, a generous mulch of compost put around the plants, and then a copious watering given to encourage them to produce a further batch of shoots to flower in late autumn in the milder districts. If the plants produce numerous new shoots, these should be thinned to not more than two or three to each plant.

Lawns should be given their quarterly dressing of 1oz. a square yard of a mixture of three parts of sulphate of ammonia, two parts of superphosphate (one part on well-established lawns), and one part of sulphate of iron. The best way of distributing this dressing evenly is to mix it with its own bulk of dry soil or sand, divide the mixture into halves, and spread each part separately, covering the lawn evenly with both.

Experts agree that it is not possible to spread more than 1oz. of this mixture to the square yard by hand without overdressing and burning the lawn in patches.

Pot on small plants into larger pots when they need it. That is ascertained by holding the pot upside down and tapping the rim gently until the plant slides out of the pot, meanwhile supporting the ball of soil with the

[*Sparrow Industrial Pictures Ltd. photo.*

Gladioli should be staked and tied before the flowers begin to open, and the lower flowers on the spikes should be removed as they begin to wither.

[*News Photo Service photo.*

Privet makes a very useful garden hedge which can be kept well furnished and neat by clipping it two or three times a year, in late spring, summer, and autumn. Overgrown privet hedges can be renovated by cutting the plants hard to within a foot or so of the ground. The strong new shoots which grow freely from the stumps will soon grow into a new hedge.

hand. If the soil seems well filled with roots, and specially if the roots look rather brown, it is time the plant was moved into a larger pot, but it is not ready to be repotted if the roots are still white and considerable areas of soil are not yet explored by them. The main pot plants should now be in full growth and making a pretty show in the house. They should be fed regularly with complete fertiliser, well watered in, or with dilute liquid animal manure.

Pot up cineraria seedlings into 3in. pots, using John Innes potting compost, as soon as they can be handled conveniently. Pot-grown cinerarias make useful flowering plants for the house in early spring, and spare ones can be planted out into the borders in autumn.

Prune flowering brooms as soon as they finish flowering, but do not cut back into old wood or the plants may die. The best plan is to shorten each shoot that has flowered back to within an inch or so of its base, but leaving the stub from which new shoots will grow.

Kerria japonica, deutzias, and early-flowering heathers should also be cut back hard when they have finished flowering. Pull out or cut off suckers springing from the base of lilacs, roses, and other trees and shrubs that are growing on a rootstock of some other variety.

Sweet peas, now in full bloom, should be gone over at least every two or three days, faded flowers being removed before seed pods have time to develop. Train and tie cordon sweet peas regularly—a most soothing occupation, conducive to deep thinking.

Watering is a necessary evil in most years and in most gardens, but it can cause more harm than good if done unwisely. If enough water is to be used to penetrate the surface layers to the soil below (and it is useless just to wet the top), a considerable volume of water is needed, and the effect of this passing through the surface soil is to cause the particles of soil to "run together" unless it is sandy or has a particularly-good crumb structure. A few hours after watering, or after heavy summer rain, the surface of the soil should be broken with a hoe to prevent it from setting in a hard, crusty layer through which air cannot penetrate readily to the roots.

Other Tasks for the Month

Make notes now about any **alterations** to be made next winter.

Plant **autumn crocus** and other autumn-flowering bulbs.

Continue picking **dead flower heads.**

Stake **herbaceous plants** that need it.

Divide and replant bearded **iris** when they finish flowering.

Wash the foliage of **pot plants** under a tap to freshen them.

Remove dead heads from **roses,** tie in the new growths of rambler and climbing roses, and start rose budding in very early districts.

Cut back **violas** and **pansies** hard.

Line out **wallflower** plants in the later districts.

Plants to Propagate this Month to Ensure a Garden Full of Flowers

Cuttings: Propagate alyssum, aubretia, sweet williams, arabis, violas, pansies, and geraniums by cuttings put in a cold frame to root. The advantage of a frame is that the atmosphere can be kept moist and the cuttings prevented from flagging, which is essential for a good percentage of "take."

Layer carnations (see drawing in December, 1947, issue).

Leaf cuttings are used for propagating begonias (rex varieties) and gloxinias. Leaves should be laid flat on a sandy soil, the main veins cut through in a few places, and the leaves kept in a moist atmosphere. To propagate saintpaulias, popular now in America as house plants, insert leaves, with the stalks still attached, upright in soil with about half the leaf below the surface; keep them in a warm, moist frame until new plants appear.

Pipings are used for propagating pinks. These are pieces 2 to 3in. long pulled out of the ends of new shoots and put in a frame to root.

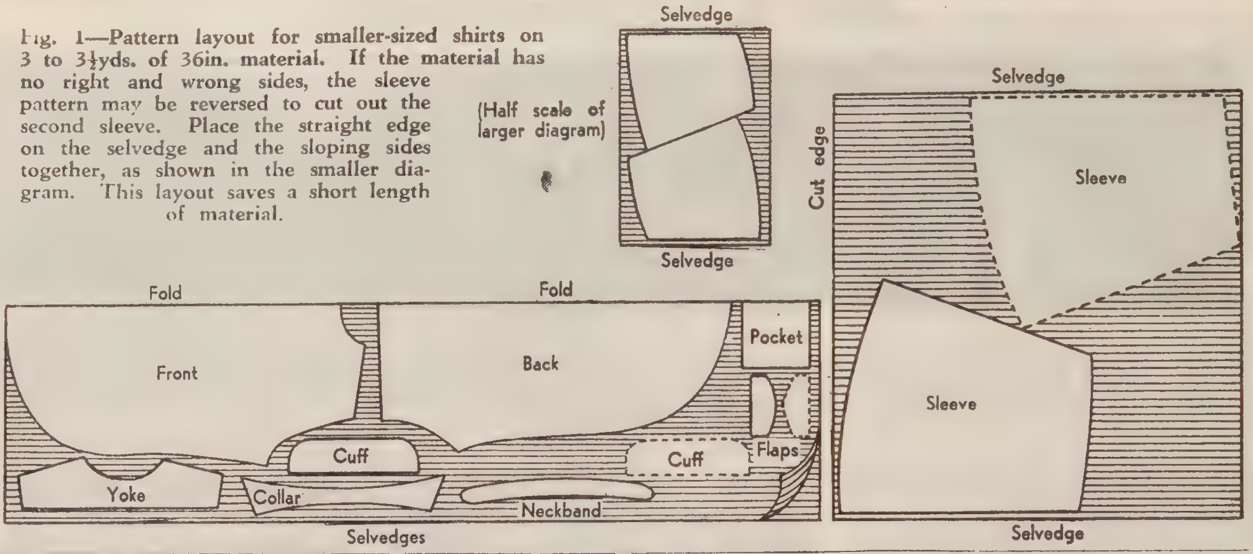
Planting of tender plants like salvias, balsams, zinnias, heliotrope, tuberous and fibrous-rooted begonias, and cosmea should be concluded even in the coldest districts. Use well-developed plants that have been grown in pots in a glasshouse and then hardened off if these are available, as pot plants suffer less check when planted and will flower more quickly after being planted.

Prick out a box or two of plants from the calendulas and other plants sown last month to have in hand a few plants suitable for setting out next month in gaps in the border. Biennials and herbaceous plants sown last month should now have germinated. The seedlings can be pricked out into boxes, 2in. apart, as soon as they are large enough to handle. Alternatively, they can be left until they are larger and then lined out 4in. apart in rows about 12in. apart in some spare part of the garden. There is much to be said for the former system.

Sow wallflowers, pentstemons, Brompton stocks, Iceland poppies, pansies, anemones, Russell lupins, anchusas, and other perennials. All these can be sown in boxes which, until the seedlings show, may be put in a shady place where they do not dry out readly. Alternatively, they can be sown thinly in open drills, 9 to 12in. apart. If the soil is very dry, draw the drills, water the soil in the bottom, leave it for an hour or two, and then sow the seeds, covering them with dry soil.

Sow, Plant, or Propagate Something Every Month of the Year

Fig. 1—Pattern layout for smaller-sized shirts on 3 to 3½yds. of 36in. material. If the material has no right and wrong sides, the sleeve pattern may be reversed to cut out the second sleeve. Place the straight edge on the selvedge and the sloping sides together, as shown in the smaller diagram. This layout saves a short length of material.


(Half scale of larger diagram)
Selvedge
Selvedge
Selvedge
Cut edge
Sleeve
Fold
Fold
Front
Back
Pocket
Flaps
Cuff
Cuff
Yoke
Collar
Neckband
Selvedges
Sleeve
Selvedge

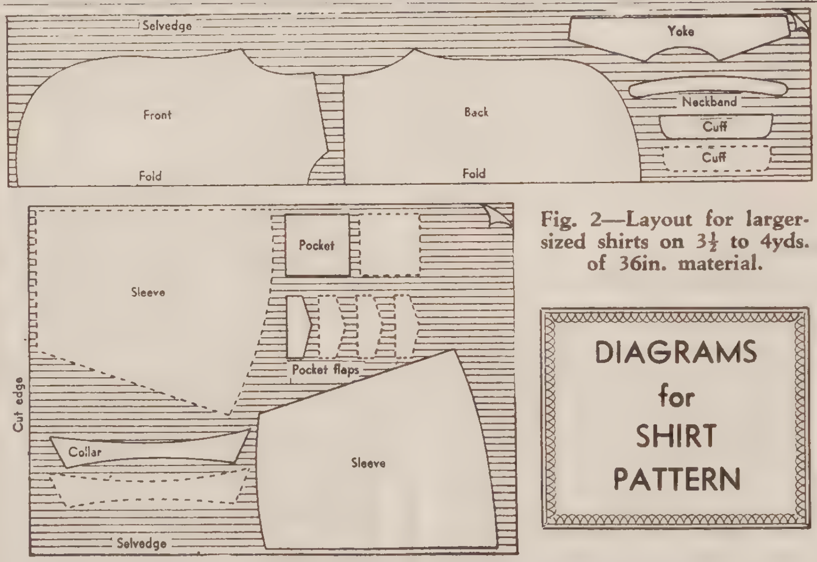

Selvedge
Yoke
Front
Back
Neckband
Cuff
Cuff
Fold
Fold
Pocket
Sleeve
Pocket flaps
Cut edge
Collar
Sleeve
Selvedge

Fig. 2—Layout for larger-sized shirts on 3½ to 4yds. of 36in. material.

DIAGRAMS for SHIRT PATTERN

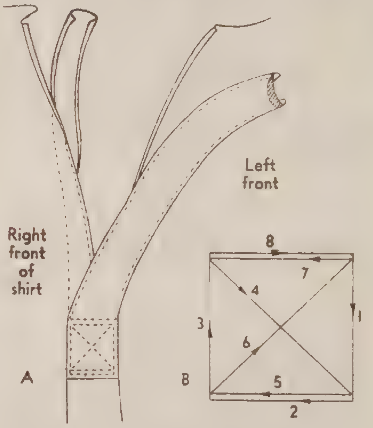

Left front
Right front of shirt
A
8
7
4
3
1
6
B
5
2

Fig. 3—A: Construction of the front opening. B: An enlarged sketch of the stitching below the opening, showing the direction of the rows.

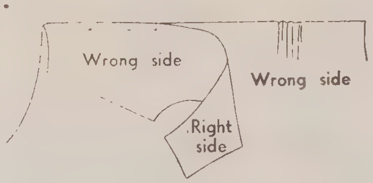
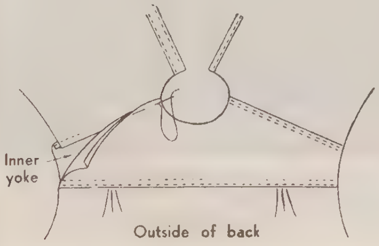

Wrong side
Wrong side
Right side

Fig. 4—Above: A section of the yoke being pinned to the back on the wrong side. Below: Setting on the yoke.


Inner yoke
Outside of back

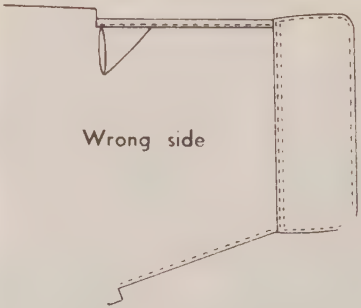
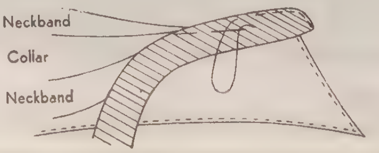


Fig. 5—The gusset set in at the end of the hem at the cuff opening.

Fig. 7—Attaching neckband sections and interlining to the collar.


Tacking round front edge of neckband
Neckband
Collar
Neckband

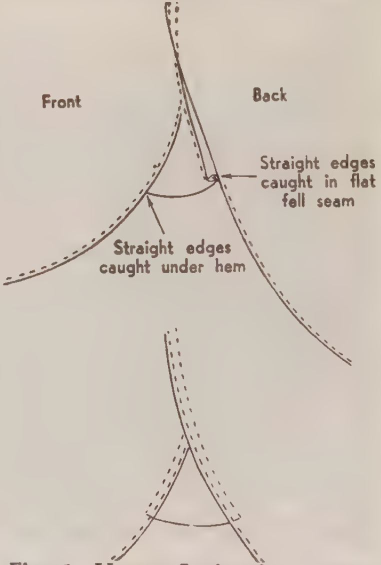
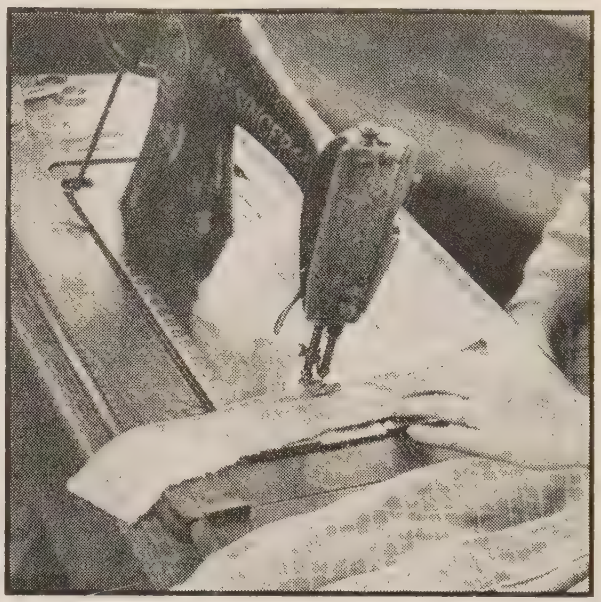

Front
Back
Straight edges caught in flat fell seam
Straight edges caught under hem

Fig. 6—Upper: Setting in a gusset. Lower: The completed gusset, showing the double row of stitching.

A New Shirt from the Pattern of an Old One

WORK shirts and boys' school uniform shirts have been difficult to buy in New Zealand and many home sewers are trying their hands at making these garments. Patterns for men's wear are also scarce, but a worn-out shirt which has fitted well can be used as a model from which to cut a paper pattern. Perhaps that is as good a way as any for a first attempt at shirt making, as construction details can be studied while the shirt is being cut up to make the pattern. The method of making the garment is described in this article by Eva Topping, Rural Sociologist, Department of Agriculture, Auckland.



[*Sparrow Industrial Pictures Ltd. photo.*

IRON the old shirt and then, with a good pair of scissors, cut to secure the following shapes: Front, back, sleeve, cuff, yoke, neckband, and collar. Cut along one side seam close to the fold, and continue cutting down the sleeve seam. Start again at the armhole, and thus remove the sleeve. Take off the cuff, keeping the scissors close to the turning. Lay aside these two pieces (cuff and sleeve) and cut across the back close to the yoke stitching, continuing down the armhole seam and the other side seam. Now the back will be loose and can be laid aside. Cut the yoke free from the second sleeve, both fronts, and the neckband, always keeping the cuts close to the turnings. Cut the collar and neckband in the same way. Unpick the stitching across the box pleat at the bottom of the front opening so that the full width of the front can be gauged.

Put pins in a sleeve piece to mark the position of the pleats at the lower edge. Put pins into the cuff at the corresponding point. Mark the length of the openings on each side of the sleeve. On the shirt back and back yoke, mark the position of the gathers; on the back and front, mark the end of the side seams. Then take a sleeve, a cuff, the back, front, yoke, and collar and iron them out flat. Fold the back in halves and press in the centre fold. Fold the front from the bottom and press in the fold from the bottom of the front opening to the hem.

Lay sheets of paper on a large flat surface, such as the kitchen table or the floor, and pin on the parts of the shirt. With a pencil and ruler, outline the shapes on the paper, leaving turnings of ½in. at all edges. For the front ignore the opening and continue on the line of the fold. Before finally removing the material pieces mark the pattern at construction points as follows:—

"Fold"—on centre back and front.
"Cut for front opening"—on front.
"Cut across here"—on front.
"End of side seam"—on back and front.
"Pleat here"—on sleeve.
"Set pleat here"—on cuff.
"Gather here"—on back.
"Gathers here"—on yoke at back.
"End of sleeve seam"—on sleeve.
"Set collar here"—on neckband.
"Straight of material"—on all pieces.
"Cut 4"—on cuff.
"Cut 2"—on sleeve, neckband, collar, yoke, and pocket.

[*Sparrow Industrial Pictures Ltd. photo.*

Write the name of the shirt part on each pattern piece. For pocket and flap patterns cut a 6in. square and a rectangle 6in. x 3in. Fold the smaller shape in half crosswise and cut it in a slope from the centre of the lower edge to a point 2in. from the top edge.

Materials

Flannel, cotton or rayon winceyette, and spun rayon are suitable materials for winter wear; dark cotton goods, drills, twill shirting, and ginghams are useful for summer garments. Depending on the size, 3 to 4yds. of 36in. wide material are required. Check the approximate amount by measuring the pattern pieces when they are arranged as in the diagram of the pattern layout.

Also needed are ½yd. of cotton material for interlining and 8 shirt buttons.

Cutting the Material

Iron any creases out of the material and lay it on a flat surface. Set the paper pattern on carefully, following Fig. 1 or 2. Keep the straight of the material parallel with any folds and with the straight edge of the sleeve seam. Cuffs, yoke, collar, and neckband are cut with the straight running across the width, as shown in the illustrations. Pin the paper to the material securely, so that the pattern does not slip and thus alter the shape of the pieces of material. Cut the material with sharp scissors, taking long sweeps to leave a smooth edge. Before removing the pattern, mark the positions of pleats, gathers, ends of seams, etc., in accordance with the instructions on the pattern.

Take the cuff, collar, neckband, and pocket flap pieces and cut 2 cuffs, 2 pocket flaps, and 1 each of the other pieces from the cotton material for interlining.

A NEW SHIRT FROM AN OLD PATTERN . . .

Making up the Shirt

Take up the front piece and start by making the front opening. Cut one strip of material 1½in. wide and the length of the front from neck edge to end of opening plus 1½in. (usually a total of about 13in.) Cut another piece 2½in. wide and the length of front opening plus 2½in. (about 14in.). Slit the shirt front down the centre from the neck to the mark on the pattern (probably 12in.).

Right Front Opening (Fig. 3)

On the right front of the shirt, turn a single ½in. fold on the wrong side. Take the narrower strip and turn a single fold ¼in. wide down each side. Tack the facing to the wrong side of the right front, leaving ½in. extra at the top and 1in. extra at the bottom. Stitch close to the edges of the folds, leave the bottom unstitched, and trim the top to match the neckline.

Left Front Opening

Turn a single fold ½in. wide on to the right side of the shirt. Take the other facing strip and lay a piece of interlining, 1½in. wide and ½in. shorter than the facing, on the wrong side. Turn a single fold ½in. wide on each side over the interlining. Tack the lined facing to the left front on the right side of the shirt, leaving 1½in. extra at the base of the opening. Stitch about ¼in. in from the folds from neck edge to the crosswise cut. Tack the box pleat in place; turn a ¼in. fold on the narrow facing (or right front) and tack it over the pleat on the wrong side. Bring the left front over the right, turn a ¼in. fold across the bottom edge of the left facing, and tack. Make a square of stitching, starting across the bottom and following the directions of the arrows in Fig. 3A.

Pockets and Pocket Flaps

The patch pockets, if required, should be put on next. Turn a ¼in. hem on the wrong side of the top of each pocket and stitch it across. Turn a single fold ¼in. wide round the other three sides. Set the pockets in place on the fronts, the measurements usually being 2½in. from the armhole edge and 8in. from the highest point of the front shoulder line. Make sure that both pockets are in line and the same distance from the centre front. If the material has a stripe or check, the pockets must also match the pattern exactly. When they are correctly placed stitch round close to the edges and make extra stitches at the corners.

Take the flap pieces and cut interlinings to the same size. Stitch round the lower edge and sides, ½in. in, leaving the top straight edge open. Trim the seams, turn, and pull out the corners and centre point with a pin; press, and stitch again ¼in. from the edge.

Tack the flap ¼in. above the top of the pocket, pointing toward the shoulder edge. Stitch ¼in. from the edge and trim to ⅛in. Turn the flap down, press, and stitch ¼in. from the top.

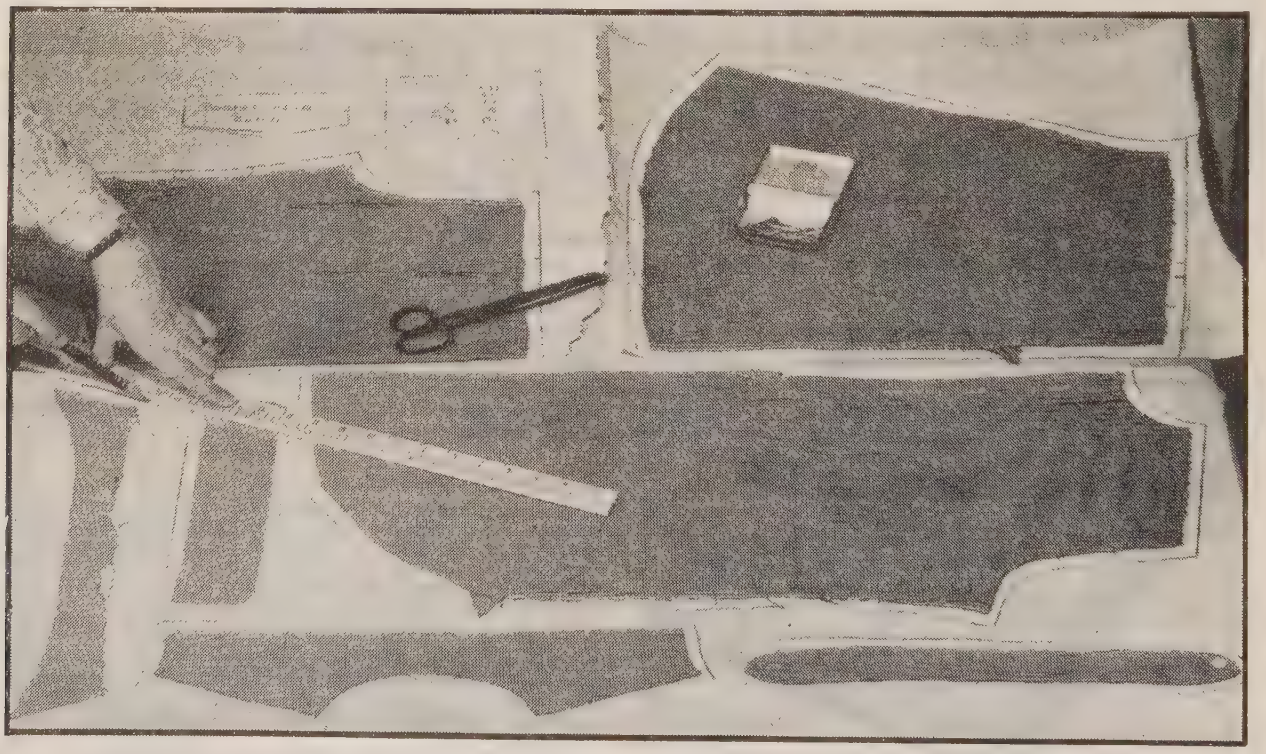
Back and Yoke (Fig. 4)

Gather the back according to the markings on the paper pattern (usually about 3½in. from the side). Pin one section of the yoke to the back on the wrong side, adjust the gathers, and tack. Pin the other yoke to the right side of the back, matching the centre folds; tack and stitch ½in. from the edge. Trim the seam and press the yokes back; stitch twice through all thicknesses, making one row close to the fold and the second ¼in. away. Join the fronts to the inner yoke and trim the seam; fold in ½in. of the outer yoke and tack over the seam just made; stitch as for the back yoke—that is, with two rows, one on the edge and one ¼in. from the edge.

Sleeves (Fig. 5)

The sleeves require gussets at the opening for the cuff. Cut two 2½in. squares of material and press them in halves diagonally. Turn a narrow hem (about ¼in.) on each sleeve from the cuff edge to the point marked on the pattern for the opening. On the front opening (straight edge) catch one side of the gusset under the hem. Tack in the pleats for the sleeve at the point indicated on the pattern.

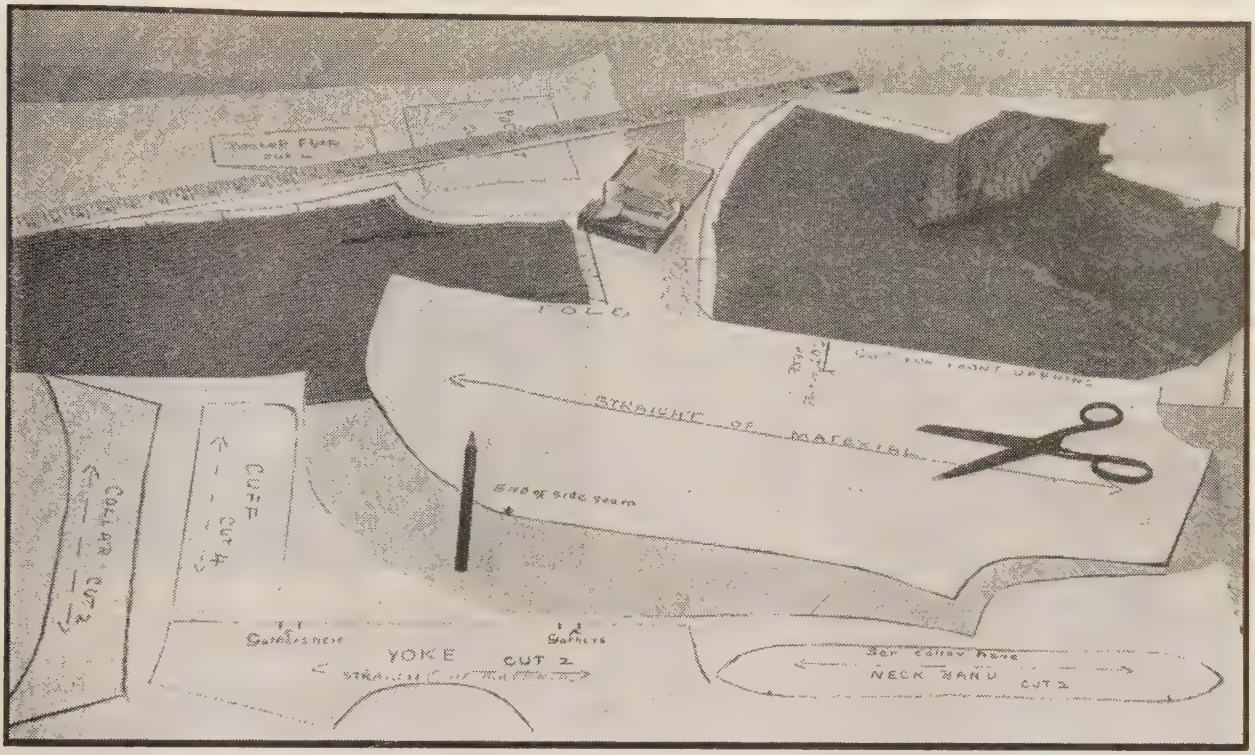
Take two cuff pieces, put the right sides together, lay one interlining on top, tack them together, and stitch (½in. from the edge) along top and sides. Trim the seam, turn the cuff right side out, press, and stitch round the closed edges, leaving the bottom open. Tack the inside of the cuff to the sleeve, stitch, trim the seam, and press back. Turn in ½in. of



[*Sparrow Industrial Pictures Ltd. photo.*

Drawing the pattern from a worn-out shirt.

A NEW SHIRT FROM THE PATTERN OF AN OLD ONE



Cutting the pattern.

[*Sparrow Industrial Pictures Ltd. photo.*

the outside cuff and tack it in place. Stitch twice to match the stitching on the yoke.

Pin the sleeves into the armhole, with the wrong side of the sleeve next to the wrong side of the shirt and with the top edge of the sleeve ¼in. below the armhole edge. When they are adjusted correctly tack and stitch ¼in. from the sleeve edge. Trim the sleeve edge and make small slits on the curved part of the armhole so that it will lie flat when turned down. Turn in the top edge, lap it over the lower, and stitch close to the fold. This gives a flat fell seam with the fold on the body part of the shirt and on the right side of the garment.

Hem the bottom of back and front, with a ¼in. hem, between the marks on the pattern indicating the end of the side seams; catch in the straight sides of the gussets at the ends of the front hem.

Joining Sleeve and Side Seams (Fig. 6)

Next tack the sleeve and side (or under-arm) seams. Starting at the armhole, match the two ends of the seams, setting the raw edge of the shirt back ¼in. below the front edge. Tack from armhole to cuff opening, then from armhole to under-arm seam opening. Tack in the other straight side of the gussets at the ends of the side seams. Stitch ½in. from the top edge, trim the lower edge and turn the fell seam down, tack, then stitch close to the fold. At each end carry the stitching over the edges of the gussets which were stitched under the hems.

Collar (Fig. 7)

Put the two collar pieces together with the right sides facing; lay the interlining on top. Tack round the outside edges, taking the stitches through the three thicknesses of material. Stitch ½in. from the edge, leaving the neckline open and making sharp angles with the stitching at the points of the collar. Trim the seams, cutting the interlining close to the stitching.

Turn the collar inside out and pull the points out with a pin or needle. Press, then tack round all sides, taking the stitch ¼in. in on the outer edges and ½in. in from the neck edge. Stitch the outer edges over the tacked line.

Neckband

Take one neckband piece and put the interlining on the wrong side. Tack them together carefully, taking small stitches so that there is no fear of the interlining slipping. Place the centre back of the collar on the centre back of the neckband with the right sides facing, then put the lined neckband on the other side of the collar, sandwiching the collar between the two pieces. Tack firmly along the neckline, leaving a ½in. turning; carry the tacking round the front edges of the band. Stitch and trim the seam, turn right side out, and press.

Put the centre back of the inside neckband to the centre back of the yoke at the neck edge on the inside of the garment. Tack from the centre back to ½in. from each end; stretch the neckline a trifle if necessary to make the neckband set properly. Stitch and trim the seam to ⅛in. Press this seam; then, starting from the centre back again, turn in ½in. of the free edge and tack down on the right side of the shirt. Stitch so that the first row of stitching is concealed; without breaking off the thread, continue the stitching round the front edge, over the seam joining collar to neckband, round the other front edge, and finish with a second row of stitching a little above the previous one joining neckband to shirt.

Buttonholes

Make 3 vertical buttonholes at equal intervals down the front and 1 horizontally at each end of the neckband. Buttonholes on the pocket flaps are placed vertically and those on the cuffs horizontally, making the backs fasten over the fronts. Mark the positions and sizes of the buttonholes, then make a "box" of back stitching before cutting the material. Use sharp scissors and make clean cuts just before starting the buttonhole stitch to avoid the risk of material fraying and giving a ragged-looking finish.

Press all the seams and smooth out any creases. Then, if the shirt is folded as illustrated, it will appear to have just come from a men's outfitting department.

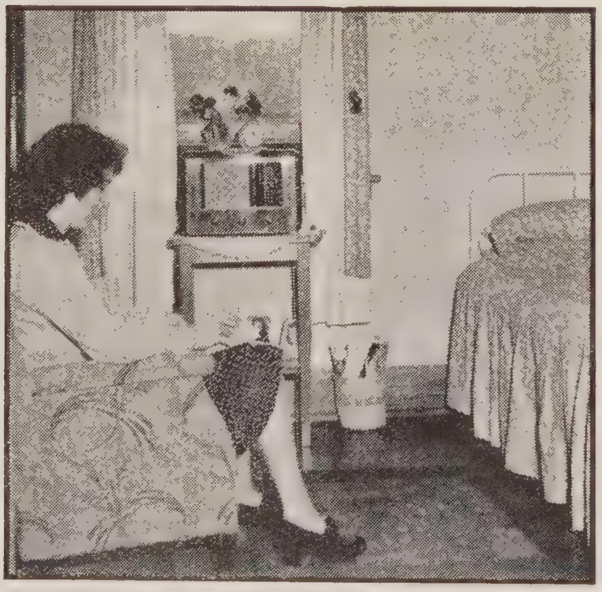
Mental Nursing Offers Opportunities for True Service

ONE of the most heartening features of the annual report of the Division of Mental Hygiene of the Health Department is the high percentage of cases which have been discharged as fully recovered—a total of 43.73 per cent. of all classes of admissions—and this despite the fact that an increasing number of old people are now being cared for in mental hospitals owing to lack of other suitable homes. Such an achievement is all the more creditable when the difficulties confronting the authorities are considered: Out-of-date buildings, insufficient accommodation, the slowing up of the extensive building programme because of lack of labour and basic materials, and, most serious of all, the shortage of nursing staff.

IN view of the acute need for more nurses, the Division of Mental Hygiene is making a special appeal to the young women of the Dominion to volunteer for this important work. Skilled psychiatric nurses can do a great deal toward re-establishing self-confidence in patients, inspiring them with hope, and so directly helping them toward recovery. Indeed, the part played by psychiatry in the successful treatment of mental disorders has widened considerably in recent years and its value is now being appreciated by the public accordingly.

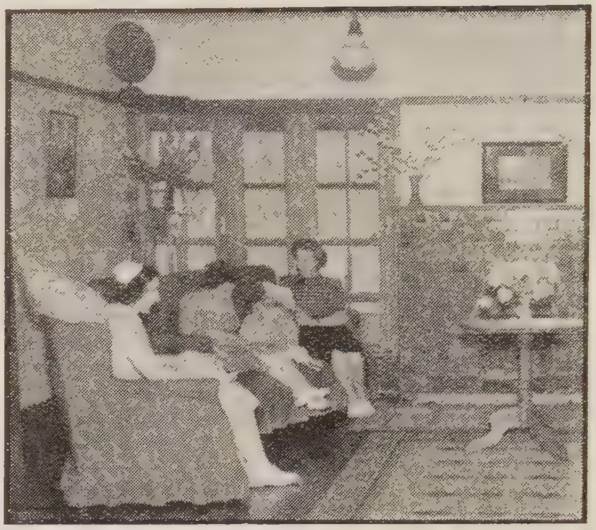
Necessary Basic Qualities

A nurse who takes up this type of work must possess the basic qualities of tact and patience, steadfastness, and ready, unfailing sympathy. A stable personality is also essential, together with good health and a suitable standard of education, but above all it is necessary to have a keen and sympathetic interest in human nature. The ideal underlying all nursing (and especially the care of the mentally sick) is the practice of the golden rule, and a good nurse always treats her patients as she would wish her own friends or relatives to be looked after if they needed similar attention. Modern methods of mental nursing, too, enable the liberty of the patients to be graded according to their individual state, allowing patients the maximum amount of freedom compatible with safety.



[*Photo News Ltd. photo.*

Each nurse has her own room, becomingly furnished to provide an attractive background for her personal belongings.



[*Photo News Ltd. photo.*

Part of the pleasant sitting-room in the nurses' quarters at a large mental hospital.

A girl may become a psychiatric nurse from the age of 18 years onward. After filling in the form provided by the Division of Mental Hygiene she is interviewed by the superintendent or matron of the mental hospital, and if deemed suitable and she passes the customary medical examination for physical fitness, she is then accepted as a trainee and introduced to her duties gradually by being placed with the quieter type of patient. When there are a number of candidates at one time they usually attend a school for a period of elementary training before going into the wards. They are also free to choose which of New Zealand's nine main mental hospitals they wish to train in, Avondale (Auckland) being the northernmost and Seacliff (near Dunedin) the one furthest south.

Facilities for Recreation

Each nurse has her own room, becomingly furnished to provide an attractive background for her own books and personal belongings, and there are pleasant dining quarters and sitting-rooms where she can listen to the radio or rest and relax. Facilities for recreation are many and vary from tennis, basketball, and kindred sports to cinema shows, hospital dances, and amateur theatricals. The authorities certainly do everything in their power to look after the needs of the nursing staff, upon whom the welfare of the patients so largely depends.

At present the staff works a 44½-hour week, with every third day off, and 2 months' leave out of every 12. The salary is £255 per annum, less £60 for board, which leaves trainees £3 7s. 6d. a week after payment of tax. In addition, they receive a bonus as compensation for weekend duty. Text books and tuition are provided free, likewise shoes, stockings (a big item), and uniforms, the particular colour signifying the wearer's nursing status.

It takes 3 years to qualify as a fully-trained psychiatric nurse and the nurse who wishes to do general hospital training as well or undertake a course in maternity training or occupational therapy is given special leave to do so. This dual training makes for increased efficiency, thereby aiding the nurse's chances of promotion as well as being of benefit to the patients in her charge. Thus the young woman who chooses psychiatric nursing as a career not only has considerable material advantages and opportunities for advancement in her profession, but the greater satisfaction to be found in true service and the alleviation of the sufferings of the afflicted.

SAVING LABOUR IN THE HOME

HOUSEWIVES, most of whom work for long hours each day and for seven days a week, often look with envy on those who enjoy a 40-hour week in industry and commerce. With help in the household practically unprocurable and most labour-saving devices expensive, few housewives see any prospects of being able to reduce their hours of work. But must they accept this as a permanent state of affairs? Are there no ways of lightening the burden of housework except hiring help or buying new equipment? Edith G. McNab, Rural Sociologist, Dunedin, discusses the part that can be played by forethought and planning.

Even small children can lighten the work of the house if they are taught to put away their own toys and clothes.

ONE of the first women to study housework and the time and energy spent on it wrote: "I believe strongly that women's liberation from drudgery lies not so much in tools as in her own methods of work" (1). That remark means more now, among the increasing complexity of modern housekeeping, than it did when it was written.

Planning Use of Time and Energy

Many busy women say they have not time to stop and plan, but working to a plan ultimately may save much more time than is spent on the initial planning. The experienced housewife may be able to plan as some monotonous task is being done—while washing dishes or shelling peas—though others find a written plan helpful, particularly at first.

The first essential in planning to make the best use of time and labour is to be alert to the possibilities of bettering the habitual or customary methods of doing the tasks, and of arranging the tasks in the most convenient order. In almost all households conditions are changing constantly, and the best arrangement of work does not necessarily remain so for all time. Before planning, the housewife must have a clear idea of the value and place of each task in the organisation of the home. She must put first those which she considers most important to family welfare, and subordinate other tasks to them.

A plan should not be rigid. Interruptions, especially in a farm home, are likely to be frequent, and the plan must be flexible enough to allow for these.

Questioning Convention

Often the home maker is guided more by what is considered usual than by her own good sense in setting herself standards. Questioning of some of these conventional standards is worth while.

For example, must the meal table always be covered with a large white cloth? Many people find that the table does not lose in attractiveness when set with table mats, or when the dishes are set directly on a painted or linoleum-covered surface. If the housewife is working long hours already, an alternative to the use of large tablecloths will save time spent in laundering.

Is ironing sheets absolutely necessary? If they are hung carefully on a line so that they dry straight, and are folded smoothly before being put away, they lose little in appearance compared with sheets which are ironed. Knitted underwear and turkish towels can be treated similarly. Clothing materials and garment styles may be chosen with regard for ease of washing and ironing. Furnishings, too, may be chosen with a view to ease of cleaning.

The results of every task can be looked at and the questions asked: "Is this result worth while in view of the time and effort spent? Is there some other task which would give a more worthwhile result for the same amount of time and effort?"

Order of Work

The order in which tasks are carried out must be fitted to the needs and activities of the family. Tasks should also be fitted in with one another, so that it is not necessary to stop in the middle of one task to do something quite different. Running between bed making and the kitchen to look at something in the oven is wasteful of time and energy, and with some forethought such a waste of steps usually

---

1. Christine Frederick in "New Housekeeping."

can be avoided. Experiment has proved that when several rooms are to be cleaned it is easier to do all the sweeping first and then all the dusting. That is, when cleaning several bedrooms time is saved by making all beds first, then sweeping or mopping the rooms, and last doing all the dusting.

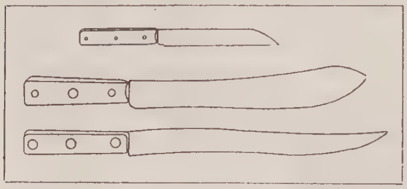
Previous planning or part-preparation of the midday meal for washing day saves time and labour. That is part of the reason why some women prefer to wash on a Tuesday, as Monday allows time for this preparation. (It also allows time on Monday for sorting and perhaps soaking the clothes.) Planning all meals ahead makes for smoother working, with no panic-stricken thought at the last minute about what to have for dinner. Planning ensures that the necessary supplies are at hand and the time needed for meal preparation is known. The family will probably be fed better when meals are planned ahead, for more consideration can then be given to providing balanced meals.

Planning enables the heavy work to be prepared over the week, so that the work load is fairly evenly distributed and there is no overworking on one day, with a carry-over of fatigue to the next day.

Special Tasks

When a task is begun all tools, utensils, and supplies should be at hand and conveniently grouped for use. Much time and energy can be wasted by stopping and retracing steps to look for and collect articles which should have been assembled beforehand. Much labour can be saved if equipment and ingredients are kept where they are used most often.

Storage space should be so used that it is never necessary to move an article to get at another behind or below it. Builders and carpenters seem to feel that shelves must always be equal distances apart, taking no account of the fact that articles of varying sizes must be stored. Racks on the insides of cupboard doors, and perhaps a half-width shelf between two others, may be added by the handyman of the family to provide for storage of small articles. Those which are in daily use should be stored within reach, so that climbing is not necessary to reach them.



Upper—A paring knife. Middle—A firm chopping knife. Lower—A flexible carving knife.

It may even be worth while to have two of one kind of small tool (for instance a knife) if it is needed frequently in two different places, for that saves walking from one place to the other to fetch the tool each time. Using the wrong tool for a task usually means wasted time and energy; choose the tool which will give the best results with the least expenditure of time and labour. Tools and utensils must be kept in good order if they are to be efficient; a sharp knife for peeling saves time, is easier to use, and helps to prevent waste.

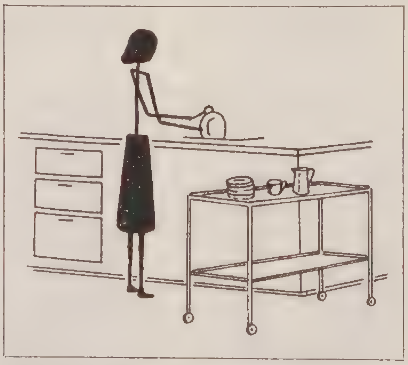
Letting the left hand do its share reduces the time required for many tasks. Try dusting, polishing, or washing windows with a cloth in each hand. Use both hands to set and clear the table and to sort laundry.

Superfluous Movements

When examining any particular task, consider whether any movements are being wasted, either in carrying out the work or in collecting and putting away tools and materials. Once motions are recognised as superfluous, measures can be taken to reduce this waste.

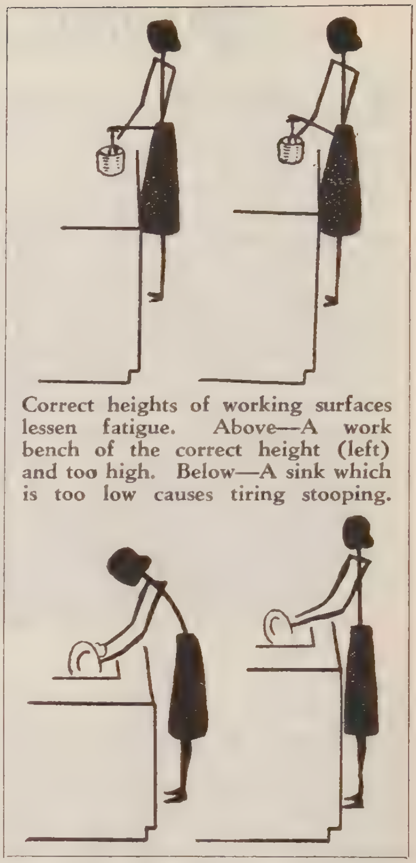
This may be applied to dishwashing. Usually the worker holds the dish being washed in her left hand, washing with the right, so the clean dishes should be put at the left side of the sink. If the washed dishes are drained at the right, the worker has to change the plate to the right hand (a wasted movement) or bring the left hand over in front of the body, which is both awkward and a waste of motion. Experiments have shown that the best arrangement is dirty dishes at the right of the sink and clean ones at the left. The cupboard for clean dishes should be at the left of the sink so that they do not have to be carried elsewhere after being washed, and one handling is enough for drying and putting away.

The dish cupboard should also be near the dining table so that as little walking and handling as possible are involved in setting the table. If there is a separate dining room, the cupboard may be made to open from either side. If it is impossible to have the cupboard at the left of the sink and the dishes must be carried to the cupboard, place them on a wagon as they are dried and make one journey instead of several.



Conditions of Work

The time taken to do work and the degree of fatigue which results are affected by the conditions under which the work is done. Much of the home maker's time is spent in the kitchen, so this room should be well ventilated and well lit by both natural and artificial light. A stuffy, steamy room reduces working efficiency and increases tiredness. Windows on two sides of the room give better ventilation and light than a window in only one wall.

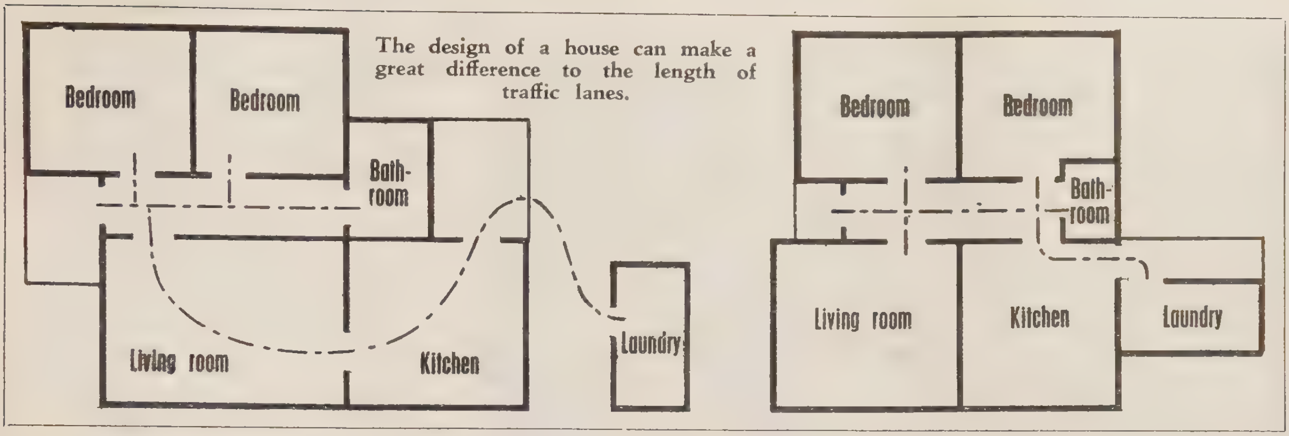


Correct heights of working surfaces lessen fatigue. Above—A work bench of the correct height (left) and too high. Below—A sink which is too low causes tiring stooping.

The position of the artificial light is important. Usually when electric light is installed there is one central ceiling light, which means that tasks at the stove or sink are carried out with the housewife's back to the light, so that the work is in her shadow. Under those conditions the work is slower and more tiring and accidents are more probable. Separate lights over the stove and sink may be well worth while and may not cost more, for light concentrated where it is needed can be supplied by a lower-powered bulb. The new tubular fluorescent lighting is good, especially in the work rooms of the home.

Anyone who has worked at a sink or washtub which is too low soon realises how much the stooping increases fatigue. Sink, bench, table, and tub heights should be such that the worker does not have to stoop or hold her arms uncomfortably high. Poor posture is a sure way of making the worker tire quickly. For a woman of average height the first figures in the following list of heights for equipment will be found comfortable, and the second figures give heights for a tall person.

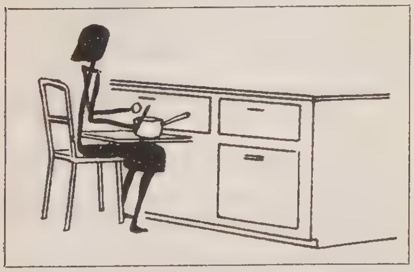
Table top for sitting work	26 to 30in.
Table top for standing work	33 to 38in.
Kitchen sink (to top) ..	34 to 39in.
Washtubs (to top) ..	36 to 40in.



The design of a house can make a great difference to the length of traffic lanes.

The average height is 33in. To judge the height of a work surface, place the palms flat on it and stand at ease; the elbows should then be slightly bent. If the arms are bent much, the surface is too high; if they are straight, the surface is too low. To test the height of a sink, stand naturally upright before the sink and place the knuckles on the bottom of it; the arms should then be straight.

If a work surface is too low, blocks may be placed under table legs or the utensil may be stood on a rack resting on top of the work surface. When a surface is too high the housewife may stand on a platform if it is not possible to lower the level. The sink bottom is often the best place to put mixtures which are to be stirred or beaten—tasks which need a lower surface than most others. A pull-out shelf at the table or bench is often a convenient way of providing a temporary lower work surface. A stool, with a footrest, of the right height on which to sit while working comfortably at the table saves some standing; it is especially useful if the knees can be put under the table.



A little ingenuity can often save much stooping. Try placing the clothes basket on a chair by the ironing board. Have a wheeled trolley for the basket to bring it to a convenient height and eliminate stooping while hanging out the wash.

Spreading Heavy Work

One way of preventing too much fatigue is to spread the heavy work over the days of the week. Plan time for rest each day. Once exhaustion is reached, a much longer period of rest and recreation is necessary for recovery, so it is better to set aside enough time for rest periods each day and so remain efficient. When several heavy and several light tasks are to be done, do them turn about—one heavy, then one light—rather than attempting all the heavy tasks one after another.

The plan of the house has a big influence on the housewife's work. Access from one part of the house to another should be easy without the need for passing through work or rest centres. The telephone should be near the living room and the kitchen so that the housewife does not have to go too far each time she answers it. The kitchen should be planned so that in the preparation of a meal progression from one task to another is easy, without waste of steps. Rounded corners, lack of ledges, and cupboards built to the ceiling or with sloping tops for dusting with a mop help to make cleaning easier. Finishes for wall, floor, and bench surfaces may be chosen according to the activities which will be carried on, and with regard for ease of cleaning as well as comfort and convenience.

Choice of Equipment

Labour-saving equipment can reduce greatly the time and effort spent by the housewife on many tasks, but the home maker cannot always take advantage of the many kinds of tools and equipment on the market. Electric power may not be available or the cost of the piece of equipment may be prohibitive. When it is possible to buy new equipment, careful consideration is required, for not all equipment sold for household use is necessarily labour saving. When choosing a tool, note its construction, judging whether it is well made and if it can be expected to have a reasonable life in use; find out if the results of using it are worth while, and if it saves time or labour (some alleged labour-saving tools take so long to put together or to clean after use that they save no time or work and are worth while only if the results are vastly superior to those of the hand process); consider costs of running a machine and possible costs of repairs and renewals as well as purchasing cost.

If the piece of equipment has to be moved, or carried or held in use, try it and make sure that the weight and the length and grip of the handle make for ease of manipulation; avoid handles which are too short. Dustpans and brushes and mops for cleaning the bath can have long handles to reduce stooping.

Buy only after investigation of the kinds available and full knowledge of how to use the machine to obtain the best results. Once obtained, equipment should be installed so that the greatest possible use may be made of it and in such a relation to other tools that all possible steps are saved.

Co-operation of the Household

The mother of a family often carries a burden proportionately heavier than that of other members of the family. They may help by carrying out some tasks or assisting in them. By taking a little thought the other members of the household can do a great deal to

Such unnecessary tasks as wiping up after muddy feet add to the housewife's drudgery.

lighten the housewife's work at the cost of little time and trouble to themselves.

Even children can do their bit in the labour of the house, small at first, but of importance to their own development as well as setting free a little of the mother's time. Children can be taught to put away their own toys and clothes. (This means making sure that there are places to keep these things which children can reach easily.) Their garments may be chosen with the aim of making them independent in dressing themselves as soon as possible.

All members of the household can put away such items as books and papers as they are finished with instead of thoughtlessly dropping them where they were used. All except the youngest children can be responsible for part at least of the care of their own clothes. By merely tidying up after themselves other members of the famly can save the housewife much labour. Cleaning the bath is easier if each user wipes it out when finished.

Who has not seen a farmer's wife wiping up after muddy feet? Remembering to clean or remove dirty boots is a small thing to ask of each individual, and no one likes to see the results of hard work spoiled by a moment's thoughtlessness on the part of others. Such small, unnecessary tasks, multiplied over the days and the years, add to the housewife's drudgery.

Punctuality at meals is another way in which all members of the household may assist in saving the home maker's time. Keeping a meal waiting usually means that little or nothing else can be done until the meal is over. Sometimes on a farm lateness for a meal is unavoidable because of some unforeseen happening, but those who are habitually late should look into the organisation of their work or agree with the housewife on a mealtime which is suitable for both.

Work in the home may be reduced by buying some things instead of making them. Country housewives do not always have the chance of doing this to the same extent as those who live in towns, though in these days only those living furthest from a town continue from necessity to do such things as make their own butter or bake their own bread.

Making the Plan

To help in checking the planning, here is a summary of the important points to consider:—

Be on the alert to try different methods or a different order of work, and choose the best for regular use.

Plan to do the work in the order best suited to family welfare and interests and to the importance of the tasks.

Allow definite time for rest and personal recreation.

Allot enough time to each task to prevent either rushing or wasting time.

Distribute the work over the days of the week.

Allow for interruptions.

Encourage each member of the family to take a fair share of responsibility.

Judging Efficiency

To form an estimate of working efficiency in the performance of a task, here are some questions to which answers should be sought:—

Is it possible to improve the arrangement or condition of equipment?

Are all the things required at hand before beginning, and are they arranged conveniently for the task?

Are working conditions comfortable and is the working surface the right height?

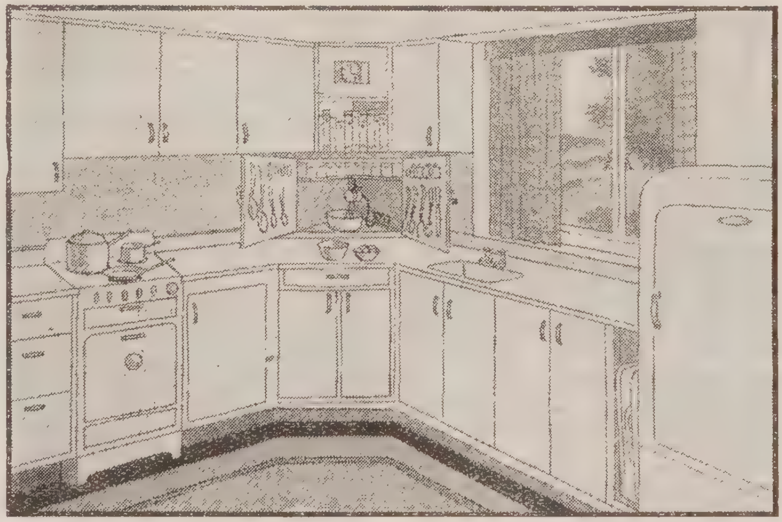
Is it possible to reduce the number of steps or the amount of stooping required?

Are any movements awkward or unnecessary?

Is the tool in use the best for the purpose and is it correctly adjusted to the task?

The whole object behind a home maker's attempts to plan her work better may be simply relief from overwork, but that is not the only consideration. A housewife may not be overworked but may not be making the best use of her time and energy. The standard of living in a home depends on family and home management as well as on the money income.

Planned for Convenience



A NEAT kitchen layout which makes for convenience and ease of working is shown in the L-shaped arrangement in the sketch above. The angles of the L have been cleverly utilised to make a handy place for baking. The corner cupboard on the bench encloses an electric beater, and the insides of the doors are fitted with hooks for storing measuring cups, spoons, and other useful cooking utensils. The narrow shelves hold tins or jars for spices, flavourings, and condiments. Cookery books are kept on an open shelf in the angle between the two wall cupboards. The drawer under the bench provides storage for the mincer, butter pats, apple-corer, parsley cutter, and similar kitchen equipment. The cupboard below contains mixing bowls, pudding basins, a rolling pin, sifter, cake tins, and other items required for baking.

Soaps, cleansers, dish cloths, and mops are kept in the cupboards under the sink, and pots, pans, and roasting tins are arranged in the cupboard to the right of the stove. On the left of the refrigerator a space has been left open under the bench to provide an excellent place for keeping trays, pastry boards, and chopping boards. Sets of drawers on the left of the stove are for storing flour, sugar, cereals, bread, and bulky stores. The wide window over the sink affords plenty of light for both stove and mixing bench.

—*EVA TOPPING, Rural Sociologist, Department of Agriculture, Auckland.*

◆

COPYRIGHT PROVISIONS

The articles in the "Journal" of the Department of Agriculture of New Zealand are copyright. Proprietors of newspapers and periodicals wishing to republish matter are at liberty to do so, **provided both the "Journal" and author are acknowledged.**

The Minister of Agriculture does not accept responsibility for any of the private and trade advertisements included in this publication.

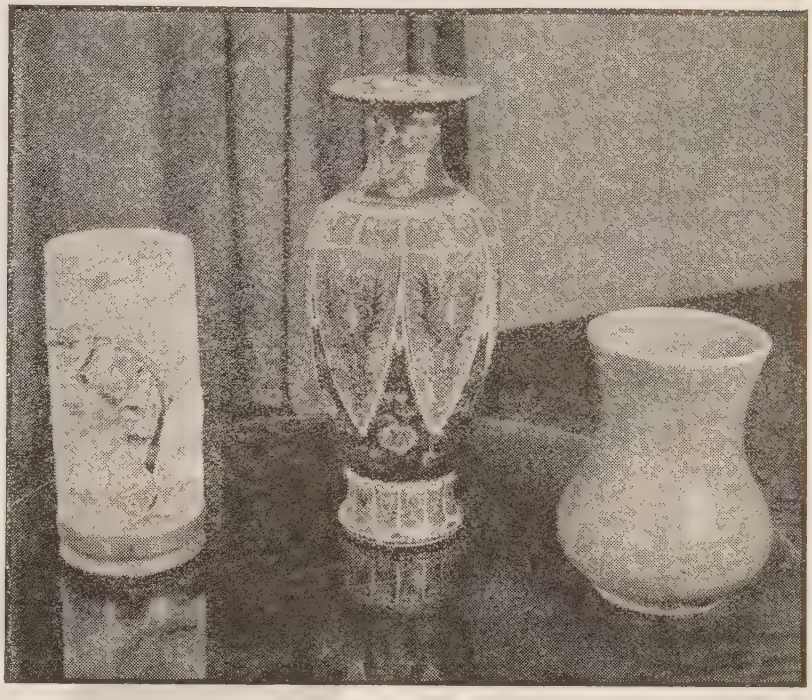
All correspondence relating to the "Journal" should be addressed to the Editor, "The New Zealand Journal of Agriculture," Box 3004, Wellington.

◆

The Importance of Good Design

By NORMA K. METSON,
Rural Sociologist, Department of Agriculture, Wellington.

ANYONE fortunate enough to have seen the exhibition of British Rural Handcrafts will remember with pleasure the delightful shapes and beautiful sheen of the wooden bowls and spoons, the various and appropriate sizes of the baskets, and the blending of colours in the decorated pottery. Most of these articles were made by hand or with hand tools; many of them were austerely plain, but others displayed ornamentation of various kinds from the symbolical stitching of the smocks to the complicated embellishments of the horse collars. All were a blending of the traditional patterns and the skill and artistry of the particular craftsmen who made them.



[*Photo News Ltd. photo.*

These three vases show three different types of ornament. The one on the left has good proportions, but is spoilt by the "stuck on" flower spray. The elaborate hand-painted designs on the Chinese vase in the centre are fitted perfectly to the shape, and the colours are rich and beautifully blended. The example of modern pottery on the right has as its only ornament a slight variation in colouring, which accents its smooth, circular form.

TODAY things in everyday use are almost entirely machine made and mass produced. Many of them are remarkably good looking; smooth, shining, electric irons, delicate glass with patterns etched or sand blasted, textile materials with interesting textures and subtle colour combinations. If well designed, the accuracy of construction and perfection of finish will compensate in many of these for any lack of the individuality which is the mark of the craftsman's product. Good design, however, is of the utmost importance, as copies of one prototype may be numbered in millions and reach almost every country on earth.

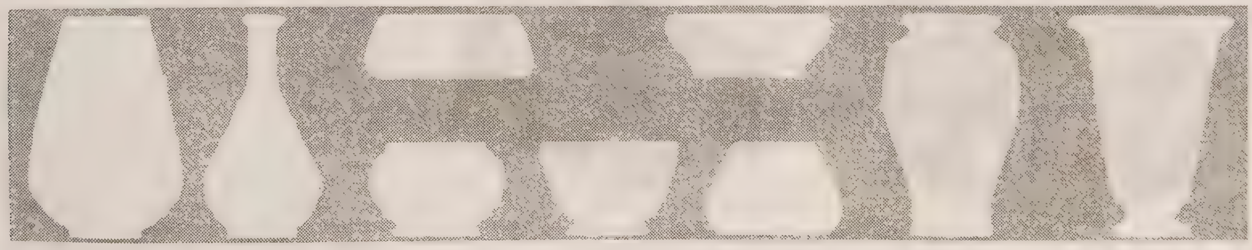
The Definition of Design

Designing is "the conscious and intentional use of materials, tools, and processes to create an object which is not only fit for its purpose, but satisfies the demands of tradition, of fashion, and of taste" (Alan Jarvis, "The Things We See," p. 41). The modern designer has many problems. He has to work with new materials like plastics and to plan equipment like home freezers, for which there is no precedent. If he is successful, his products will be economical to make, satisfactory to use, and good to look at. When good design is ignored the results are unlovely and inefficient, such as bakelite trying to look like wood, jugs which will not pour without dripping, occasional tables which tip over with the slightest touch.

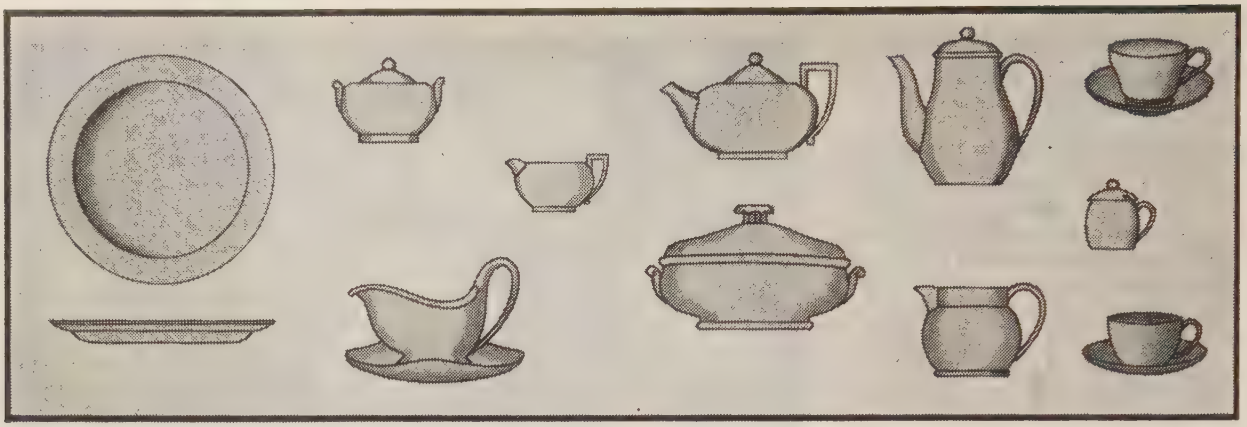
In other words, and again they are those of Alan Jarvis, design is a matter of forming the shape and appearance of things, and "the shape of things is determined by four limiting factors, the material out of which they are made, the function which they are meant to perform, and the influence of tradition and of fashion. But there is nearly always a fifth factor which may influence any of the other four, the desire to make things beautiful." In spite of all new developments, good forms and lines once evolved remain valid for all time. Greek vases, Maori decorative patterns, and the original Wedgwood pottery designs, which are still being made today, have a beauty of line, proportion, and rhythm which is lasting and satisfying to the eye and mind.

Faults in Modernistic Design

Probably the most common fault in modernistic design is the misuse of streamlining. The sleek, smooth lines of cars and aeroplanes are very pleasing in appearance, but streamlining is necessary only for objects which must move at very high speeds. It is absurd to apply it to refrigerators and wash-basins, and there can be few housewives who work at such speed that they derive benefit from its incorporation in the design of their irons.



These cut-out vases are simple and effective. Note the variations in height, breadth, and shape.



These designs from Josiah Wedgwood's original pattern book, dated 1769, are still being made today.

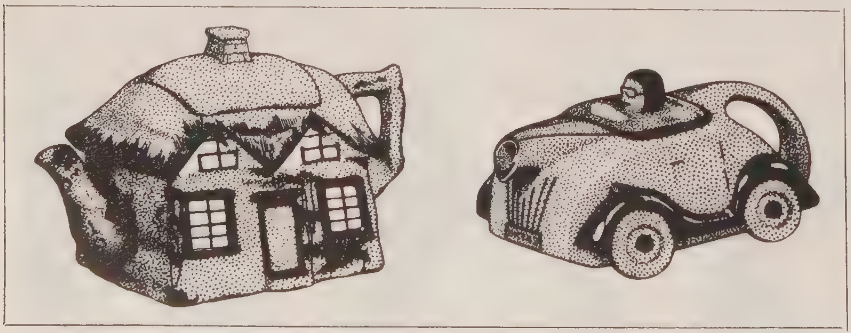
Corners should be rounded rather than sharp, and graceful curves give a smooth finish and simplicity of outline, but flat surfaces and corners are equally necessary at times. Strangely enough, too, the curving and smoothing process is often neglected where it would be most useful, such as on the inside surfaces of saucepans, jugs, and other receptacles which are much easier to clean if the sharp angle at the base is eliminated. Plastics, pottery, and moulded glass materials lend themselves naturally to curved forms.

The design of the modern telephone is most suitable for the work it has to do and the plastic material from which it is made.

New materials, new functions, and new processes are continually being introduced, but such is cultural conservatism that they are frequently rejected merely on the grounds that they are new and will not be accepted until they are forced into some semblance of familiarity. It is this attitude which has been responsible for the production of many articles essentially false such as electric "candles" complete with wrought-iron holder and shade and ornate "period" furniture in which, as A. R. D. Fairburn says, "the tuis were singing a year ago." Old forms are retained and repeated in new materials to some of which they are most unsuited or made to serve new functions for which they were never intended. Nor should there be any attempt to conceal the true form of an object. A well-shaped teapot which pours freely and is easy to hold is a pleasant-looking thing. There is no need for it to be decked out in the fancy dress of a cottage, a cat, or a car. Even worse are the wirelesses and cocktail cabinets concealed behind rows of false bindings in bookcases.

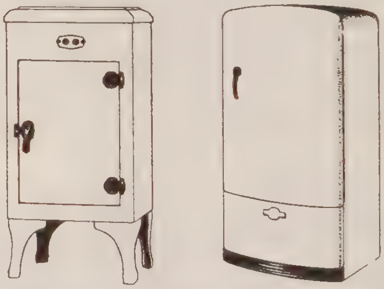
Misuse of Ornamentation

The misuse of ornamentation is another frequent source of poor design. Decoration or ornament (for example, the traditional gold line round the edge of a cup or plate) is not essential to the function of an article, but can add greatly to its attractiveness. The decoration should be in keeping with the style of the object and it should be an integral part of the structure, not stuck on afterwards. An example of a poor ornament would be a vase intended for the display of real flowers and decorated with sprays of naturalistic, raised flowers and leaves or a dressing table with pieces of wood glued to the drawer fronts to make a pattern. However, a neat border pattern on the outer edge of a plate, a careful matching of the wood grain on a veneered surface, or interesting murals on the wall panels of public buildings add character and beauty to the things they adorn.



A well-shaped teapot is pleasant to look at and its use is obvious. Why should it be hidden under the disguise of a car or a cottage?

Poor workmanship or materials are usually the reasons why household appliances, especially the small ones, do not work well, but the basic design may also be at fault. A saucepan, for example, may be unsatisfactory because the enamel is of low quality and crazes and chips with use, but it may be equally unsatisfactory for use on an electric or heat-storage stove if it has a curved instead of a flat base. Knives or cups may be well made and of the best materials, but they are useless if their handles are shaped so that they cannot be held comfortably.



Both the mechanical efficiency and exterior design of refrigerators have improved in the last 20 years. The design of the modern refrigerator (right) contrasts sharply with that of the older model (left).

Insincerity, lack of fitness for purpose, and inappropriate ornamentation are three major faults in the design of any object. The test of whether an article's design is good is its ability to work well, the quality of the workmanship, and whether it is attractive.

CHRISTMAS GIFTS from the Kitchen

[*Sparrow Industrial Pictures Ltd. photo.*

CHRISTMAS just would not be Christmas without presents, but they do not all have to be bought in a shop, and some of the most welcome are those made by the giver. Clever needlewomen rarely have to search far for ideas for making small gifts, but what of the woman who is not nimble with a needle? In this article Eva Topping, Rural Sociologist, Department of Agriculture, Auckland, suggests that she look around the pantry shelves or get busy in the kitchen making home-produced presents which will be original, attractive to the eye, and pleasant to the taste. "Special" cakes, biscuits, sweets, small pots of jam, mincemeat, chutney, pickles, and relishes all make most acceptable gifts.

ANY Christmas present is twice as attractive when packed in wrappings appropriate to the season, so gather a stock of printed waxed paper, red, green, and clear cellophane, tinsel, narrow ribbons, paper doilies and serviettes, labels, and cards. Cardboard boxes for cakes and sweets and tins for biscuits will also be useful. They can be covered with the gaily-printed wrapping papers of which there is a plentiful and varied supply this year. Flour-and-water paste is quite successful for covering cardboard, but tins need something stronger; a tube of glue is most satisfactory and is easy to use.

A single jar of mincemeat, chutney, relish, or sweets can be decorated with a doily cap and stood in the centre of a serviette or square of printed wrapping paper. Draw the corners up to the neck and tie a ribbon to secure it firmly.

Boxes of Jams

Half a dozen small jars of jam of different kinds would make a delightful present for a small town household—perhaps one jar each of lemon cheese, marmalade, rhubarb, Christmas plum, tree tomato, or new season strawberry jam, gooseberry jelly, and honey. Small jelly jars are a convenient size, and though it is not essential to have the pots all the same shape, such uniformity in the containers adds greatly to the appearance of the packed box. Cover the seal of each jar with a "lace cap" made with a paper doily, secure it with an elastic band, and tie bright red, green, or tinsel ribbons over the band to give a pretty finish. If coloured pictures of the appropriate fruits can be found in seedsmen's catalogues or magazines, cut them out and stick them on the tops instead of the usual label.

Cover a suitable box (a boot box is about the right size) with decorated paper. Set in the jars, arranging them with ribbons in alternating colours. Fill up the corners and spaces with crumpled tissue paper or serviettes to prevent the jars knocking against each other in transport. Put the lid on and tie the box with narrow ribbon, decorating it with a large cellophane bow, labels, a card, or in any other way that seems appropriate.

Such a box of jars cannot be posted, but if it is packed carefully, it should withstand a journey by car, bus, or carrier's truck.

Tins of Biscuits

Everyone enjoys a biscuit, and a tin received as a Christmas present would be sure of a welcome in any home. Here are some recipes for biscuits which keep well; with favourites from the housewife's own store of recipes they will make a tempting range of varieties.

Chocolate-bit Biscuits

4oz. of butter
2 tablespoons of sweetened condensed milk
9d. size bar of dark chocolate
2oz. of sugar
6oz. of flour
1 teaspoon of baking powder
Pinch of salt

Cream the butter and sugar, and add the condensed milk, sifted flour, baking powder, and salt. Last, stir in the chocolate cut in small pieces. Form the mixture into a long roll with the hands on a lightly-floured board, and slice it into rounds with a sharp knife or drop it by teaspoonfuls on to a cold, greased oven tray and press it with the tines of a fork. Bake the biscuits in a moderate oven until they are slightly browned.

Crisp Fruit Biscuits

½ cup of butter
1 cup of brown sugar
1 egg, well beaten
1 cup of chopped raisins
½ cup of chopped nuts
½ cup of chopped dates
10oz. of flour (two full teacups)
2 teaspoons of ground cinnamon
½ teaspoon of ground cloves
1 teaspoon of baking powder
½ cup of milk

Cream the butter, and add the sugar slowly, beating them well. Add the beaten egg. Sift the flour, spices, salt, and baking powder, and add them gradually to the creamed mixture alternately with the milk, blending in the fruits and nuts. Drop the mixture by teaspoonfuls on to greased oven trays and bake it in a moderate oven (375 degrees) for 10 to 15 minutes. Split almonds, pieces of glace cherry, or walnut pieces can be set on top of the biscuits before they are baked.

Ginger Snaps

½lb. of flour
½lb. of sugar
½lb. of golden syrup
1 egg
3oz. of dripping or lard
1½ teaspoons of ground ginger
½ teaspoon of baking soda
½ teaspoon of ground cinnamon
Pinch of salt

Melt the fat and add the golden syrup and beaten egg. Sift the dry ingredients into a bowl and stir in the fat

CHRISTMAS GIFTS FROM THE KITCHEN

[*Sparrow Industrial Pictures Ltd. photo.*

A box of small jars of different jams makes a delightful gift.

mixture to make a smooth dough. Turn it out on to a floured board, roll it very thin, and stamp it into round biscuits. Put them on a cold, greased tray and bake them in a moderate to slow oven for 10 to 15 minutes. Watch the biscuits, as they scorch easily when almost baked.

White Ginger Biscuits

¼lb. of butter
½lb. of flour
¼lb. of sugar
1 egg
½ teaspoon of ginger essence

Rub the butter and sugar into the flour. Beat the egg with the essence, and mix them to a stiff paste. Roll it out thinly, cut it into shapes, and sprinkle them with sugar. Put the biscuits on a cold, greased tray and bake them for about 15 minutes.

Honey Stars

½ cup of mixed fruit (currants, sultanas, peel, dates, and figs)
½ cup of seedless raisins
2 tablespoons of honey
1 tablespoon of water
1 tablespoon of orange juice

Mince the fruits coarsely or chop them into fine pieces, blend them with the honey and orange juice, then cook them to a soft paste over gentle heat to make the filling.

½ cup of butter
½ cup of sugar
1 cup of cornflakes
1¾ cups of flour
1 teaspoon of baking powder
4 tablespoons of water
½ teaspoon of vanilla essence

For the biscuit mixture cream the butter and sugar until they are light, sift the flour and baking powder, and add them alternately with the water to the creamed mixture; then stir in the cornflakes. Roll the dough very thin and cut it into star shapes. Cut out a small circle from the centre of half the star shapes; a thimble makes a useful cutter, and is the right size. Put a little filling on the centre of a whole biscuit, cover it with a cut-out star, and press the points together. Bake the biscuits on a greased tray in a moderately-hot oven (400 degrees) for 10 to 12 minutes.

This quantity makes about 20 filled biscuits; if half the dough and filling is used, the other portion can be made into "funny faces" to amuse the children. Roll the dough thin, cut it into rounds, and make faces on them by cutting out 2 circles with the thimble a trifle above the centre, making a hole with a skewer or steel knitting needle to indicate a nose, and cutting a curved slit for a mouth. Use the sharp point of a kitchen knife and widen the slit a little at the centre. Curving the slit upward at the ends will make the face smile; curving it downward will give a doleful expression.

Butter Biscuits

From this mixture a great variety of biscuits may be made, according to the decorations or icings used for finishings. A few variations are suggested here but many more may be chosen.

1 cup of butter
½ cup of sugar
3 cups of flour
Pinch of salt
1 beaten egg
2 teaspoons of vanilla essence
1 flat teaspoon of baking powder

Cream the butter and sugar, beating them until they are light and fluffy, and add the beaten egg and vanilla. Stir in the flour, salt, and baking powder gradually after sifting them. Roll the mixture thin on a lightly-floured board, cut it into the shapes desired, and bake them for 12 to 15 minutes in a moderately-hot oven (350 degrees). The mixture will make about 5 dozen biscuits.

Almond biscuits: Cut the dough into oblong shapes (a ½lb. mustard tin makes a useful cutter) and press half a blanched almond in the centre of each biscuit before baking them.

Chocolate squares: Spread the biscuits with thin chocolate icing and put half walnuts in the centres.

Chocolate coconut biscuits: Cut the dough in rounds and cover the baked biscuits with thin chocolate icing. While the icing is still wet, dip the biscuits into a saucer of desiccated coconut, shake them to remove the surplus coconut, and leave them to dry.

Lemon stars: Cut the dough into star shapes, and when the biscuits are baked cover them with white icing made with lemon juice and icing sugar. Grate a little yellow rind, mix it with ordinary sugar, and sprinkle it over the stars when the icing is half dry. If the sugar is sprinkled on wet icing, it will dissolve and the frosted sparkling effect is lost.

New moons: Cut the dough into crescent shapes. When the biscuits are baked cover them with pale yellow icing.

Nutty ovals: The small oval shapes left over when cutting crescents can be sandwiched together with icing or jam, spread with icing, then dipped into chopped nuts.

Make sure the biscuits are quite cold and the icings or fillings are dry before packing them into the decorated tins.

[*Sparrow Industrial Pictures Ltd. photo.*

Chocolate-chip cakes ready for packing.

CHRISTMAS GIFTS FROM THE KITCHEN

[*Sparrow Industrial Pictures Ltd. photo.*

Some of the sweets and biscuits the making of which is described in this article.

Boxes of Sweets

Sweets are a customary part of the Christmas indulgences, and a box of home-made confectionery is a much more thoughtful gift than the box bought at the last minute to fill a gap in the present list. Here are some recipes:—

Coconut Cream

1 tablespoon of butter
¾ cup of milk
2 cups of sugar
½ cup of desiccated coconut
½ teaspoon of vanilla essence

Melt the butter in a saucepan, add the milk and sugar, and stir until the sugar is dissolved, heating slowly. Boil the mixture for 12 to 15 minutes, remove it from the heat, add the coconut and vanilla, and beat it until it is creamy. Pour it into a buttered tin, smoothing the top with the back of a wooden spoon. Cool it and cut it into squares or fingers.

Chocolate Raisin Candy

3 cups of sugar
1 cup of milk
½ cup of seedless raisins
4 tablespoons of cocoa
1 tablespoon of butter
1 teaspoon of vanilla essence

Put the sugar, milk, and cocoa into a saucepan and heat them gently until the sugar is dissolved, stirring constantly. Boil the mixture until it makes a soft ball when tested in cold water. Take it from the heat, add the butter, vanilla, and raisins, and beat it until it is creamy. Pour it into buttered tins and cut it into pieces when it is cool.

This mixture can be varied by using ¼ cup of chopped nuts and ¼ cup of raisins.

Walnut Fudge

2 cups of brown sugar
⅓ cup of milk
¾ cup of chopped walnuts
1 tablespoon of butter
½ teaspoon of almond essence

Put the sugar, milk, and butter in a saucepan, bring the mixture to the boil, and cook it with as little stirring as possible until it reaches the soft ball stage. Take it from the heat, add the nuts and essence, and beat it until it is creamy. Pour it into greased tins and cut it into small pieces when it is cool.

Peppermint Creams

½lb. of icing sugar
White of 1 egg
Essence of peppermint

Sieve the sugar and add ½ teaspoon of peppermint, or a little more according to the strength of flavour preferred. Whip the white of egg until it is stiff and mix it into the sugar. Turn the mixture on to a sugared board and knead it until it is smooth. Roll it out ¼in. thick with a bottle and cut it into small rounds. Place the creams on waxed paper and leave them overnight or until they are dry.

Sweets Made with Honey

Three recipes for sweets were included in the article "Cooking with Honey" in the "Journal of Agriculture" for July, 1948, page 95.

Cakes

Cakes which are a little different for afternoon tea and similar meals make a pleasant contrast with the rich Christmas fruit cake. If they are baked in shallow, square tins, they fit into a decorated box better than if round. Both the following recipes fill the bill as extra cakes for Christmas tea tables:—

Coffee Walnut Cake

4oz. of butter
3oz. of sugar
5oz. of flour
1 teaspoon of baking powder
2 eggs
1 tablespoon of coffee essence or extra strong coffee

Beat the butter and sugar to a cream, add 1 egg, and beat again, adding the second egg while still beating. Add the coffee essence, then the sifted flour gradually. Finally stir in the baking powder. Spread the mixture in a greased and floured tin and bake it for about 20 minutes in a moderately-hot oven (375 degrees). Allow it to cool, cut it in halves, spread each piece with icing, and sprinkle the chopped nuts on top.

2oz. of butter
1 cup of icing sugar
2oz. of chopped walnuts
1 dessertspoon of coffee essence or strong coffee

For the icing, cream the butter and add the icing sugar gradually alternately with the coffee while continuing to beat.

Chocolate-chip Cake

¾ cup of butter
1 cup of sugar
2 eggs
1¾ cups of flour
2 flat teaspoons of baking powder
2 tablespoons of cocoa
2 tablespoons of sugar
1 cup of hot water
1 teaspoon of vanilla essence
Pinch of salt
1 cake of dark chocolate
½ cup of chopped walnuts

This quantity will make 2 cakes if they are baked in 7in. square tins.

Cream the butter and sugar and add the eggs and vanilla. Mix the cocoa, extra sugar, and hot water together, cool them, and add them to the creamed butter mixture. Sift the flour, salt, and baking powder and stir them in gradually. Pour the batter into greased and floured tins and sprinkle the tops with cut chocolate and chopped nuts. Bake the cakes in a moderate oven (350 degrees) for 45 minutes. Cool them in the tins for 15 to 20 minutes and dust them with icing sugar while they are still warm.

Pack the cakes with plenty of soft paper—decorated serviettes are ideal for the purpose—and set them in fancy boxes or tins.

**so small—
but oh! so deadly**

Don't let

BORER

***and* FUNGI**

destroy YOUR valuable property

Borer, termites, other wood-eating insects and decay fungi do amazing damage for their size. In a few years they can reduce a house to a tottering shell. Protect your property by having it BORACURED at the first sign of borer or decay. Or better still, let Boracure make an inspection now without fee or obligation. Borer and decay often do extensive damage before their presence is readily noticeable. Get in touch with . . .

BORACURE (N.Z.) LTD.

217 Lambton Quay, Wellington.
Phone 40-050

Branches throughout the Country.

The answer's a LEMON!

Use Lemons liberally as

- **LEMON PEEL**
- **LEMON MARMALADE**
- **LEMON DRINKS — Hot or Cold**
- **LEMON FLAVOURED PUDDINGS**
- **LEMON DRINKS for the CHILDREN after School**

Give Lemon Drinks frequently to those with Feverish Colds and Rheumatic pains because Lemons are a source of Vitamin C.

ISSUED BY THE DEPARTMENT OF HEALTH

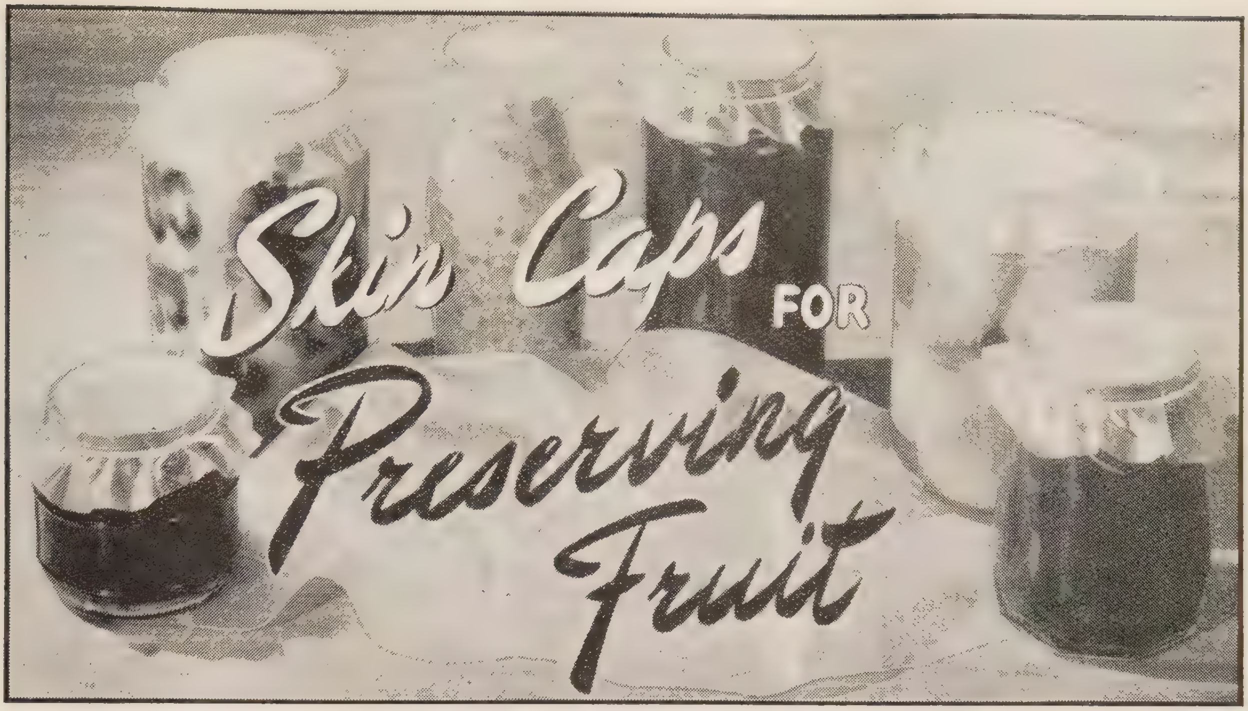
7.48

Your best buy in Blankets

Onehunga

WOOLLENS WITH A PEDIGREE

Distributors throughout N.Z. SEAL OF QUALITY STANDARD SARGOODS *Sargood, Son & Ewen Ltd.*



Skin Caps FOR Preserving Fruit

[*Sparrow Industrial Pictures Ltd. photo.*

NOW that the season for preserving fruit is approaching, many housewives will be taking stock of their equipment, and, perhaps, exclaiming rather ruefully at the shortage of jars with suitable tops for the screw-on type of cap and lid. Both for housewives with many odd-sized jars, unsuitable for preserving fruit in the usual way, and for those who prefer to preserve fruit in small jars and have found the shortage of pint-size jars a problem, the special type of skin seal, of which plentiful supplies should be available soon, will be most useful. The method of using it is described in this article by Evelyn E. Moore, Rural Sociologist, Department of Agriculture, Auckland.

THIS fruit-preserving skin is a synthetic, airtight, waterproof, slightly-elastic material not unlike a plastic in appearance. It is supplied in sheet form so that it can be cut to fit any size or shape of jar or bottle. It is inexpensive and can safely be used more than once if care is taken to avoid cutting or damaging the skin when removing it from the jar. It can be softened for re-use by immersion in boiling water for a few seconds.

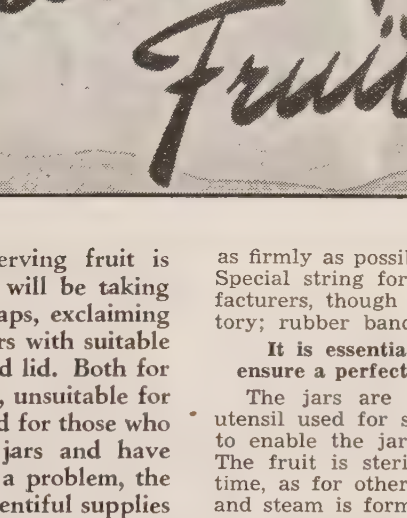
Boiling Water-bath Method

The use of the boiling water-bath method of preserving fruit is advisable with this type of sealer, as it is both safer and simpler.

The jars are packed with the washed and prepared fruit in the usual way, and the syrup or water is then poured on to cover the fruit, allowing about ½in. of space at the top of the jar. The skin, which has been washed and cut to fit the jar (allowing a generous overlap for tying), is stretched tightly across the mouth of the jar and tied on as firmly as possible by the method shown in the diagram. Special string for this purpose is supplied by the manufacturers, though any strong, fine white string is satisfactory; rubber bands are not suitable.

It is essential that the skin be tied very tightly to ensure a perfect seal.

The jars are then packed in the saucepan or other utensil used for sterilising, which should be deep enough to enable the jars to be completely covered with water. The fruit is sterilised in boiling water for the requisite time, as for other caps. As a jar of fruit becomes heated and steam is formed, pressure is raised in the jar, so that the skin billows up like a balloon. That does not affect the seal, for when the jars are removed to cool, the pressure is reversed and the skin gradually sinks into the mouth of the jar, forming a taut, airtight seal.



The string is pulled as tight as possible round the skin cap and tied on the opposite side of the jar.

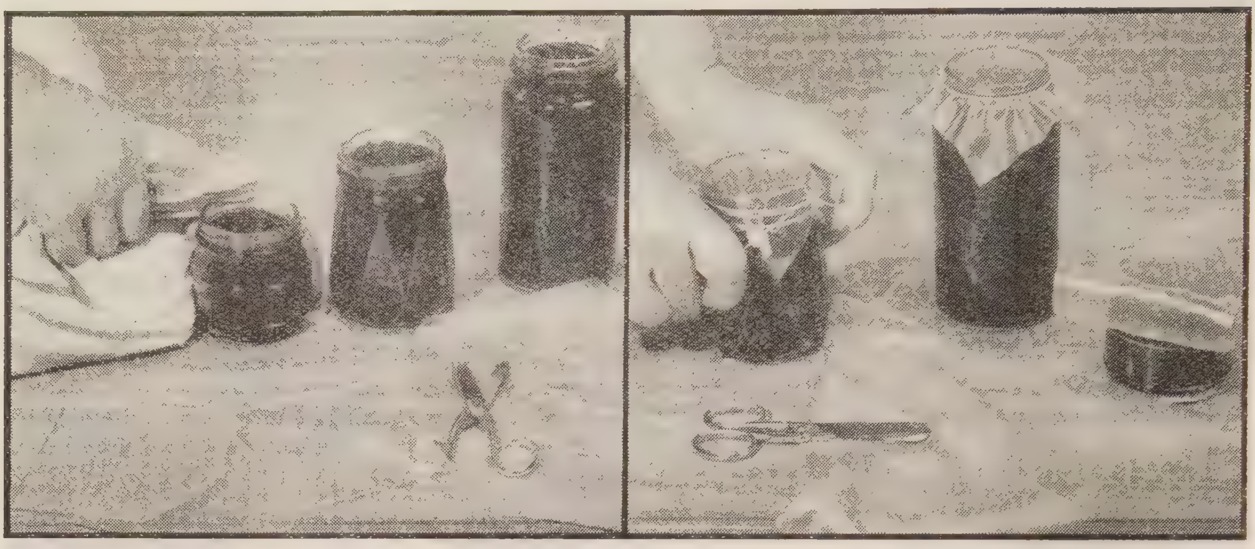
If the surface of the skin is not concave and taut, and appears soft and flabby, the seal is imperfect, probably because the string has not been tied tightly enough. If that occurs, it should be retied, a fresh piece of skin being used if necessary, and resterilised. When the jars of fruit are cold and they have been examined to see that the seal is perfect, they may be stored safely in the usual way.

Complete success should be achieved if the instructions, which are given with every piece of sealing skin, are carried out accurately. The fruit retains its colour and flavour as well as in jars sealed with other types of lids.

Preserving Pre-cooked Fruit

Skin seals may also be used for preserving fruit that has been cooked before being put into jars. The boiling fruit is poured to overflowing into the hot, sterilised jars, the rims are wiped clean, and the skins, which have been sterilised in boiling water, are tied down immediately.

The hot jar makes this process more difficult, but it is facilitated if a rubber



[*Sparrow Industrial Pictures Ltd. photo.*

Left—Each jar is filled with fruit and syrup, allowing about $\frac{1}{2}$in. of space at the top of the jar, and the rim wiped before the tying on of the skin, which has been cut to the required size. Right—After being drawn tight, the skin may be kept in place with a rubber band until the string is tied.

band is slipped over the skin to hold it in place until the string is tied.

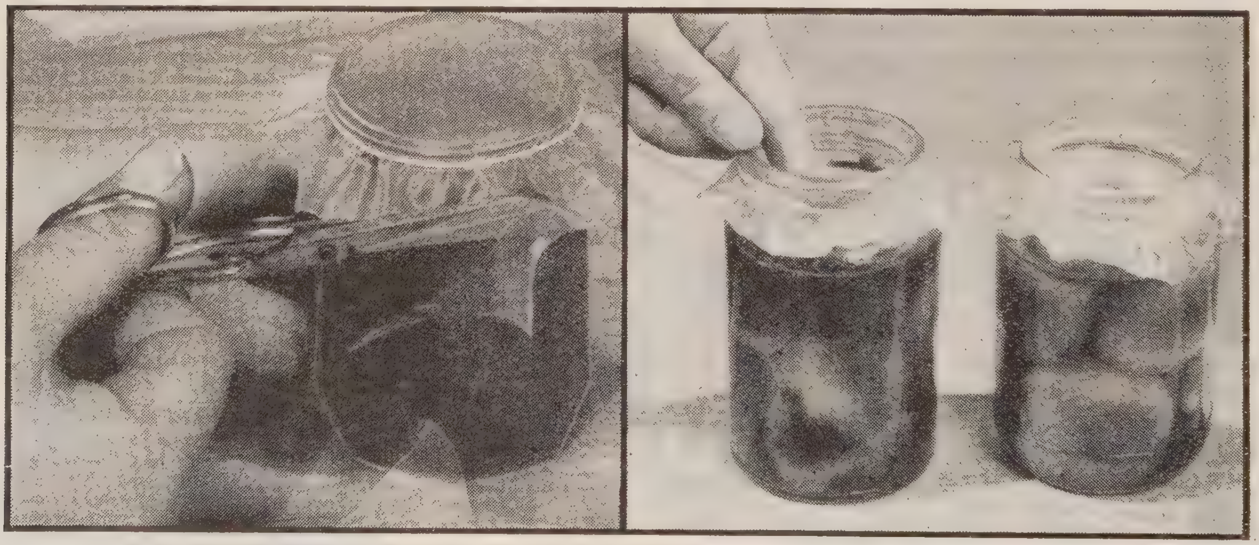
Preserving by the Oven Method

The oven method is slower than the others, but it can also be adapted to the use of preserving skins. The fruit is prepared and bottled as usual, but the skin should not be tied on until after the fruit has been sterilised. Old lids or patty tins may be used to cover the jars during sterilisation in the oven. When the fruit is cooked the jars should be refilled to overflowing with boiling water or syrup, if necessary, and the skins tied down immediately as in the method with pre-cooked fruit.

In these methods also the skin should sink into the mouth of the jar and become taut if the seal is perfect. If not, the use of a fresh piece of skin may be necessary before resterilisation if tying the string more tightly does not effect a seal. If the instructions are followed, however, no difficulty should be experienced in obtaining a perfect seal with every jar after the first sterilisation.

Simple and Economical

Though the use of skin caps is simple and economical for preserving fruit, it is just as necessary to sterilise the fruit properly with this method as with any other, and the string must be tied tightly to ensure a perfect seal. If that is done and the manufacturer's instructions are followed carefully, this method can be thoroughly recommended.



[*Sparrow Industrial Pictures Ltd. photo.*

Left—The corners of the skin are trimmed after it has been tied on. Right—If the seal is perfect on jars of fruit that have been processed and cooled, the skin is drawn taut into the mouths of the jars.

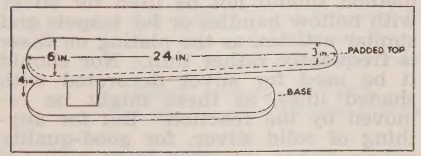
Pressing Woollen Garments

GOOD pressing can make a vast improvement to the finished appearance of home-made garments. Woollen and worsted fabrics are the most difficult to press well, as they scorch easily and the problem of shrinkage must be considered. Most women have to depend on their home equipment for pressing, especially during the making of woollen garments, when seams must be pressed as they are completed and before they are crossed by another seam. In this article Edith G. McNab, Rural Sociologist, Department of Agriculture, Dunedin, describes the making and using of equipment which will simplify the task.

EVERY home has the ordinary ironing blanket or ironing board, but with this alone pressing of some woollen garments is difficult. If much woollen clothing is made at home, a sleeve board, a seam board, and a tailor's cushion are well worth having. A sleeve board can be bought, and sometimes one is sold with an ironing board, but a tailor's cushion is more difficult to obtain. Fortunately, it is simple for the home dressmaker, perhaps with some assistance from the handy man of the family, to make such useful pieces of equipment.

Making a Sleeve Board

A piece of board 1in. thick and about 2ft. long, cut to taper in width from 5 or 6in. at one end to 3in. at the other, is the first requirement for a sleeve board. Corners and edges are well rounded off. For a base prepare a piece of board 5 or 6in. wide and 1in. thick, almost as long as the first board. Mount the sleeve board on this, 3 or 4in. from the wider end, by fixing a block of wood about 4in. high (cut from a piece of 2in. x 3in. or 3in. x 4in. wood) between the two. Use screws, not nails, for joining the pieces, as nails would soon work loose and the board would be unsteady when in use. The screw heads must be sunk into the surfaces of the sleeve and base boards; if they protrude, they will be in the way when the board is in use and may cause raised marks on the material being pressed. Use at least two screws for attaching both the sleeve board and the base to the upright block. The sleeve board may be bolted or clamped to an ironing board instead of being mounted on a base. All surfaces of the wood must be sandpapered smoothly so that delicate fabrics will not catch on it.



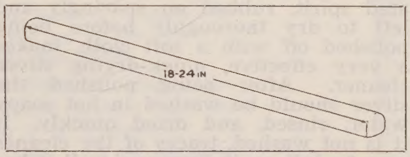
Old blanket or turkish towelling may be used for padding. Padding material must be soft and have no joins, patches, or holes. Thick soft felt may be used and glued to the board; thin felt such as is used for making hats is not suitable. Avoid coloured material, as dye may come out when anything damp is pressed. Whatever the material, the padding must be smoothly and firmly applied so that it will not wrinkle under pressure of the iron. Keep the corners and edges smoothly rounded. If the padding is fixed with tacks or drawing pins to the under side of the sleeve board, see that the heads of the tacks are well driven in so that nothing will be caught or torn on them.

Last, make a removable, washable cover. It may be tied on with tapes, or it may be fitted to slip over the narrow end of the board and be tied across under the wider end with tapes. Any strong white or unbleached fabric in a plain weave may be used; a pattern in the weave of the covering material may be imprinted on the garment being pressed. Strong calico, sheeting, or duck makes a good covering material. New material should have any dressing washed out before it is used.

Such a board will prove most useful for pressing sleeves and short seams.

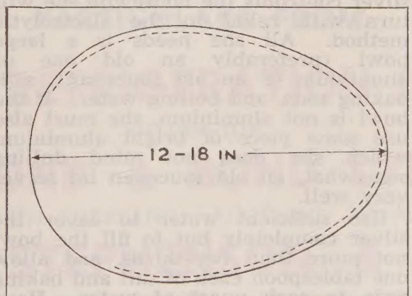
Seam Board

The use of a seam board for pressing seams avoids having the imprint of the seam allowance on the right side of the garment, as often happens when seams are pressed on flat surfaces. To make a seam board use a piece of wood 2½in. square and 18in. to 2ft. long. Smooth off the two upper edges to make a half cylinder of the wood. The uppermost part of the curve should be slightly flattened. Then the rounded part of the board is padded and covered.



Tailor's Cushion

A tailor's cushion is indispensable for pressing curved and shaped parts of garments and for shrinking out any slight fullness at the end of a fitted dart in a tailored garment, or at the shoulder seam or top of a plain sleeve where one piece of fabric has been eased on to another. It is so convenient that anyone using it for the first time will wonder how she managed without it before.



To make the cushion, take two ovals of strong white or unbleached material (previously washed if new) from 12 to 18in. long and narrower at one end than the other. Sew them together by machine, leaving one end open for stuffing. Stuff the cushion with clean rags (woollen or soft cotton) very tightly until the cushion is about 9in. thick. It must be very firm when filled. Sew up the opening to make a smooth join.

Pressing Technique

Woollen goods must always be pressed with a cloth between the iron and the garment, as wool scorches easily. The iron should not be too hot. Any medium-weight white or unbleached cotton cloth in a plain weave is suitable for a pressing cloth. Unless the garment is only half dry after being washed dampen the pressing cloth. Many people prefer to use first a damp pressing cloth, then, after steam has been forced through the woollen fabric, a dry cloth; that helps to speed up the pressing.

It is usually best to press on the wrong side of a garment and to press only one thickness of fabric at a time, except with articles such as slacks and faced parts of garments. Smooth out the part to be pressed and place the damp pressing cloth over it, using it double if the woollen fabric is thick. Then put down the iron and press only the area the surface of the iron covers. Do not push the iron about, for movement and pressure combined with moist conditions will cause shrinkage. Hold the iron in one position till steam from the damp cloth is forced through the wool. Then lift the iron and put it down in a new position. Treat a small area this way, continuing until the woollen fabric is almost dry. It should still contain a little steam when pressing is finished. Just before this stage it is permissible to move the iron lightly over the area to remove any outlines of the edge of the iron. If desired, a dry cloth may be substituted for the damp one after the fabric is impregnated with steam, but pressing must stop while there is still a little steam in the cloth. Pressing continued to the completely-dry stage is likely to leave the surface of the woollen fabric shiny. Let the pressed area remain flat or hang straight until the rest of the steam has disappeared. If the garment is wrinkled or folded with this slight dampness remaining, new creases will be formed.

Tacking threads holding pleats or facings in position in new garments should be clipped in many places and the short lengths of thread removed about halfway through the pressing process, disturbing the material as little as possible. Then finish pressing. If the pressing is completed before the tacking threads are removed, marks of the positions of the threads will be left.

Shrinking out Slight Fullness

In making fitted woollen garments it may be desired to have smooth seams with no slight fullness caused by the easing on of fabric. Anyone who has not attempted shrinking out fullness should try the process on a sample before attempting it on a garment. Be cautious, and remember that shrinking cannot be undone. Distinguish between this shrinking out of puckers or fullness and the shrinking of new material before it is cut out: Then the aim is merely to release the tension put on the fabric as it was stretched to dry in the factory and to let it resume its natural size, the whole fabric being treated; now the aim is to cause interlocking of the wool fibres to take up a definite shape to fit over curved parts of the figure, and only parts of the garment are treated. This process cannot be reversed, and it causes a reduction in size of the parts treated.

To carry out this shrinking arrange the part of the garment to be treated over the end of the sleeve board or over the tailor's cushion, whichever fits the part best and best reproduces the curve of the body it is designed to fit. Press it with a damp cloth under the iron, and move the iron about as it is pressed down. Be careful to restrict treatment to the area which is to be shrunken. The combination of pressure, moisture, and movement will cause the wool fibres to mat together and the area treated will shrink in size. Slight gathers can be made to disappear. It may be necessary to repeat the process until sufficient shrinking is brought about.

METHODS OF CLEANING SILVERWARE

GOOD silverware is slowly coming back on to the New Zealand market, but the cleaning of it can become a laborious task. This article by Eirene Unwin, Rural Sociologist, Department of Agriculture, Dunedin, deals with the usual plate-powder method and the much less laborious electrolytic method, which does away with all the rubbing on and polishing off with which the housewife is probably all too familiar.

EVEN if silverware is being used every day, once a week is too often for it to be cleaned, involving unnecessary wear on the silver as well as taking up the time of the housewife. Once in two weeks is sufficient if the silver is washed promptly and thoroughly after each use. If it is not used regularly, it need be cleaned far less frequently as long as it is stored carefully in a dry place.

Rubbing and Polishing

Plate powder is still very hard to obtain, and a useful substitute is whiting. A paste of whiting and methylated spirit, rubbed on sparingly and left to dry thoroughly before being polished off with a soft cloth, makes a very effective, quick-drying silver cleaner. After being polished the silver should be washed in hot soapy water, rinsed, and dried quickly. If it is not washed, traces of the cleaner may be left on it, however well it has been polished.

Use this method for small quantities of silver or for hollow-ware. A soft brush helps to clean hard-to-reach crevices in teapots, but for all ordinary embossed silverware the electrolytic method is much simpler.

The Electrolytic Method

Whenever a great pile of tarnished silver confronts the housewife she will turn with relief to the electrolytic method. All she needs is a large bowl (preferably an old one of aluminium or an old saucepan), salt, baking soda, and boiling water. If the bowl is not aluminium, she must also use some piece of bright aluminium which she does not mind dulling somewhat; an old saucepan lid serves very well.

Use sufficient water to cover the silver completely but to fill the bowl not more than two-thirds, and allow one tablespoon each of salt and baking soda to each quart of water. Have the water in the bowl boiling and the piece of aluminium in it if a non-aluminium bowl is used. Measure out the salt and soda, add it to the boiling water, and at once put in the silver. A strong effervescence will take place at first—hence the precaution of not having the bowl too full. The chemical action set up between the substances removes the tarnish from the silver without damaging its surface. Too much silver will cool the water to below the temperature necessary for the reaction to occur, so it may be advisable to polish it in more than one lot, using fresh water, salt, and soda each time. After effervescence has ceased and all tarnish has been removed wash the silver in hot soapy water as usual.

There is a minute loss of weight from silver so treated, but under a microscope the surface is much smoother than that polished with many ordinary silver cleaners.

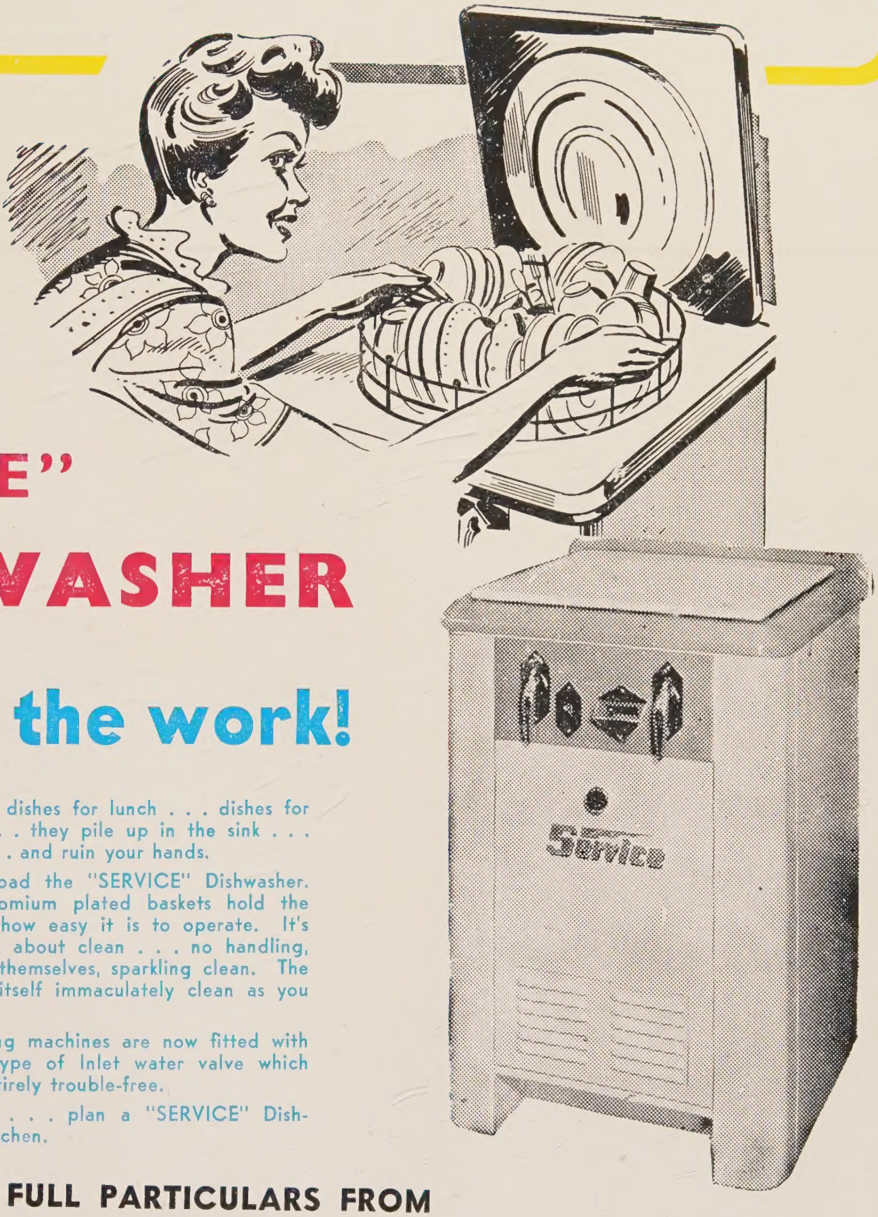
It is essential that the aluminium be in contact with the silver or the electrolytic action will not occur. This method should not be used for silver with hollow handles or for teapots and similar articles, as the plating on these is frequently rather thin. Nor should it be used for silver decorated with shaded lines, as these might be removed by the reaction. But for anything of solid silver, for good-quality entree dishes, or other large pieces it is very convenient if no part is of a material that may be damaged by the hot water or the chemicals. Its chief value is for large quantities of table silverware, especially forks, and for embossed silver.

To remove egg stains from silver, stand it for 10 minutes in contact with aluminium in boiling water and salt. This method is quick and causes the minimum of damage to the surface of the silver.

Heading photograph by Sparrow Industrial Pictures Ltd.

Printed by Blundell Bros. Ltd. (The Evening Post), Wellington—26159

It's so easy — and it saves me so much time !



The

"SERVICE"

DISHWASHER

does all the work!

Dishes for breakfast . . . dishes for lunch . . . dishes for dinner. Always dishes . . . they pile up in the sink . . . "eat up" your evenings . . . and ruin your hands.

See how easy it is to load the "SERVICE" Dishwasher. See how gently the chromium plated baskets hold the glasses, china, etc. See how easy it is to operate. It's remarkable . . . and talk about clean . . . no handling, the dishes wash and dry themselves, sparkling clean. The stainless steel tub keeps itself immaculately clean as you use it.

All "SERVICE" dishwashing machines are now fitted with the new and improved type of Inlet water valve which is easy to operate and entirely trouble-free.

Banish wash-up drudgery . . . plan a "SERVICE" Dishwasher in your modern kitchen.

FULL PARTICULARS FROM

ELECTRIC REFRIGERATION (N.Z.) LTD.
WAIRARAPA WELLINGTON SOUTH ISLAND

BOND & BOND LTD.
NORTH AUCKLAND AUCKLAND WAIKATO

WRIGHT STEPHENSON & CO. LTD.
HAWKE'S BAY WANGANUI BLENHEIM ABRAHAM & WILLIAMS, MANAWATU

EUROPA
EUROPA
EUROPA
EUROPA

EUROPA

SERVING
NEW ZEALAND
AND
NEW ZEALANDERS
WITH THE
HIGHEST QUALITY

PETROLEUM
PRODUCTS

MARKETED BY
A 100 PER CENT NEW ZEALAND COMPANY